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CONTENTS.

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THE GOULSTONIAN LECTURES on Modern Views on Diabetes and on the Significance of Acidosis in Disease. By E. P. POULTON, M.A., M.D. Oxon., F.R.C.P. Lond., Assistant Physician, Guy's Hospital.—Lecture III. 31

ORIGINAL ARTICLES.

The Absence of the *Bacillus Influenzæ* in the Exudate from the Upper Air-passages in the Present Epidemic. By Captain T. R. LITTLE, C.A.M.C., O.C., Captains C. J. GAROFALO and P. A. WILLIAMS, C.A.M.C..... 34

On Some Unusual Forms of Epidemic Disease.—General Report by A. K. CHALMERS, M.D. Glasg., F.R.F.P.S., D.P.H. Polio-encephalitis and an Epidemic Disease of Obscure Origin by R. M. F. PICKEN, B.Sc., M.B., Ch.B. Glasg., D.P.H. Outbreak of an Acute Febrile Disease in Three Factories and an Industrial School in Glasgow by A. MACLEAN, M.B., Ch.B. Glasg., D.P.H..... 35

A Clinical Study of Craniotabes. By EDMUND HUGHES, M.R.C.S. Eng., L.R.C.P. Lond., Lieutenant, R.A.M.C.(Temp.).—(*Illustrated*) 36

The Nervous Sequelæ of Cerebro-spinal Fever. By CECIL WORSTER-DROUGHT, M.B. Cantab., &c., Temporary Captain, R.A.M.C..... 39

A New Method of Preparing Gonococcus Antigen, and a New Technique for the Complement Deviation Test. By DAVID THOMSON, M.B., Ch.B. Edin., D.P.H. Camb., Captain, R.A.M.C. 42

A Quick Method of Diagnosing the Type of Meningococcus in Cases of Cerebro-spinal Fever. By A. S. GORDON BELL, M.R.C.S., L.R.C.P. Lond., Temporary Major, R.A.M.C.; and Miss I. M. HARMER..... 43

A Note on the Loss of Complementing Power in Kept Serum. By J. S. C. DOUGLAS, D.M. Oxon., M.Sc. Birm., Captain, R.A.M.C. (T.F.); and J. W. BIGGER, M.B., B.Ch. Dub.—(*Illustrated*) 44

Kala-Azar in Malta: Two Cases Treated by Intravenous Injection of Tartar Emetic. By H. I. WINIFRED KERR, M.B., Ch.B. Glasg., Attached R.A.M.C. 45

Technical Re-education in Italy. By Professor ETTORE LEVI (Florence), Member of the Executive Committee of the Italian National Commission for the Assistance and Protection of the Disabled..... 53

REVIEWS AND NOTICES OF BOOKS.

An Enquiry into the Analytical Mechanism of the Internal Ear. By Sir Thomas Wrightson. With an Appendix on the Anatomy of the Parts Concerned by Arthur Keith, M.D., F.R.S..... 46

A Manual of Bacteriology, Clinical and Applied. By R. Tanner Hewlett, M.D., F.R.C.P., &c. Sixth edition 47

Laboratory Studies in Tropical Medicine. By C. W. Daniels, M.B. Camb., F.R.C.P. Lond.; and H. B. Newham, M.D. Dub., D.T.M. & H. Camb. Fourth edition..... 47

Treatment of Gonorrhœa. By N. P. L. Lumb, Temp. Capt., R.A.M.C..... 47

A History of Departed Things. By Mrs. Henry Head 47

The Journal of Physiology. Edited by J. N. Langley, D.Sc., F.R.S. Vol. LII., No. 1 48

The American Review of Tuberculosis..... 48

NEW INVENTIONS.

A Combined Gas-Oxygen, Gas-Oxygen-Ether and Warmed-Ether Apparatus (Charles T. W. Hirsch, M.R.C.S., L.R.C.P. Lond., Temp. Capt., R.A.M.C.).—(*Illustrated*)..... 48

LEADING ARTICLES.

MODERN VIEWS ON DIABETES .. 49

THE MEDICAL TREATMENT OF ELEMENTARY SCHOOL CHILDREN 50

A NATIONAL SCHEME OF INDUSTRIAL MEDICAL RESEARCH 50

ANNOTATIONS.

The Prevailing Pandemic. 51

Regonine and its Derivatives..... 51

The Development of the Medical Profession: the Cavendish Lecture. 51

Antineuritic and Antiscorbutic Factors in Food 52

Incidence of Infectious Disease in 1917 52

The Treatment of Sciatica by Lumbar Anæsthesia 52

The Primary Cause of Shock..... 53

SPECIAL ARTICLES.

Dried Milk for Infants..... 55

The Belgian Doctors' and Pharmacists' Relief Fund: Subscriptions to the Second Appeal..... 55

THE SERVICES..... 64

CORRESPONDENCE.

Juries and War-time Changes (Dr. Lovell Drage) 56

"Sexual Perversion" (Sir H. Bryan Donkin)..... 56

Methods of General Anæsthesia in Facial Surgery (Mr. J. D. Mortimer, Captain R. Wade, R.A.M.C.)..... 56

The Risks of Alcohol Injection for Trigeminal Neuralgia (Mr. Arthur H. Cheatle) 56

Similar Treatment for Similar Employ (Dr. W. D. Anderson) 57

Epidemic Encephalitis (Dr. F. G. Crookshank)..... 57

Insured Patients and Expensive Drugs (Dr. F. C. Poynder)..... 57

THE WAR.

The Casualty List..... 57

Casualties among the Sons of Medical Men..... 57

The Honours List 57

OBITUARY OF THE WAR:

James Tennant Whitworth Boyd, M.D., C.M. Ontario, Captain, Canadian Army Medical Corps.—(*With Portrait*)... 59

Philip Beauchamp Sewell, M.D. Melb., Captain, Australian Army Medical Corps 59

INDEX NOTICE.

THE LANCET, VOL. I., 1918..... 60

MEDICAL NEWS.

Royal Colleges of Physicians of London and Surgeons of England: Pass list 61

Royal College of Surgeons of England: Election of Members of Council 61

West London Medico-Chirurgical Society..... 61

Royal Colleges of Physicians and Surgeons, Ireland..... 61

Royal Medical Benevolent Fund Guild..... 61

Devon County Mental Hospital 61

Public Health (Tuberculosis) Regulations, 1918 61

The McQuitty Exhibition..... 61

Bristol Royal Infirmary..... 61

Medico-Psychological Association of Great Britain and Ireland 61

URBAN VITAL STATISTICS:

Vital Statistics of London during June, 1918..... 60

Analysis of Sickness and Mortality Statistics in London during June, 1918..... 60

English and Welsh Towns..... 61

Scotch Towns..... 61

Irish Towns..... 61

OBITUARY.

Sir James Acheson MacCullagh, M.D. Dub., J.P..... 62

Deaths of West of England Medical Men..... 59

PARLIAMENTARY INTELLIGENCE.

Notes on Current Topics.—Maternity and Child Welfare Bill..... 62

House of Commons..... 62

NOTES, SHORT COMMENTS, &c.

Folk-Medicine in the Aran Islands..... 66

Resuscitation from Drowning.... 66

An Extemporised Centrifuge..... 66

The Use of Fruit-stones for War Purposes..... 66

Appointments 65

Vacancies..... 65

Births, Marriages, and Deaths... 65

Medical Diary..... 65

Editorial Notices..... 66

Acknowledgments of Communications received 65

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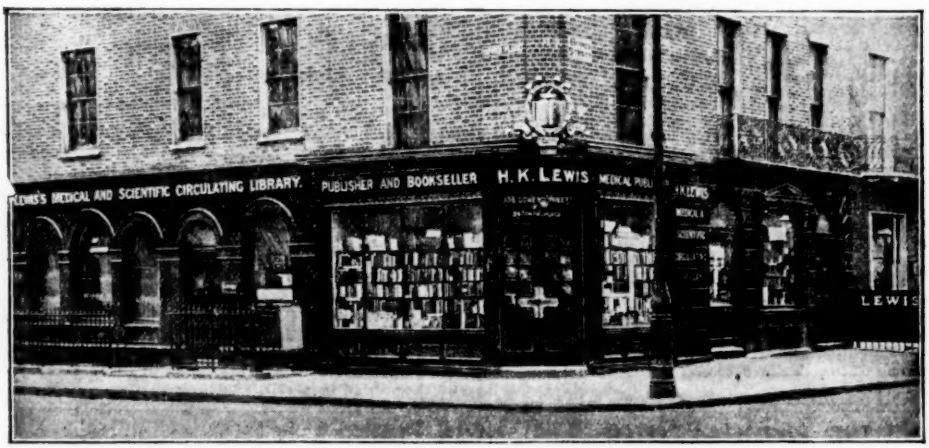

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LECTURE III.*

ACIDOSIS IN DISEASE.

MR. PRESIDENT, LADIES AND GENTLEMEN,—In the first lecture Barcroft's definition [2] of acidosis was given; it is an increase of acid relative to basic radicles in the blood, the CO_2 of the blood not being considered. It has nothing to do with the final reaction of the blood—i.e., its hydrogen ion concentration.

MECHANISMS OF BODY IN DEALING WITH ACIDOSIS.

Under many physiological conditions of acidosis the hydrogen ion concentration of the blood remains constant, because the CO_2 content of the blood is reduced to compensate for the increase in acid radicles—a condition of "compensated acidosis." In other circumstances the CO_2 may not be lowered sufficiently, when an "uncompensated acidosis" results—i.e., the hydrogen ion concentration is increased. In other cases the acidosis is "over-compensated" when the respiratory centre is over-active, and washes out more CO_2 than is necessary, so that the blood becomes more alkaline than normal. This often occurs in diabetic acidosis of moderate severity.

This condition of over-compensation implies an alteration in respiratory control, so that over-ventilation occurs and the blood becomes alkaline, or, what is a different way of expressing the same thing, the excitability of the respiratory centre is increased, so that it reacts to a lower concentration of hydrogen-ions than usual. The variation in the excitability of the respiratory centre has been denied by Haldane, but there is evidence that it occurs normally. Straub [1] has shown that the alveolar CO_2 is distinctly higher during sleep in the middle of the night than it is in the day-time, which suggests that the respiratory centre, like the heat regulating centre, has a regular diurnal periodicity.

Under ordinary circumstances the respiratory centre is extremely sensitive to small additions of acid to the blood, and maintains the normal reaction of the blood by a fall in the alveolar CO_2. This fall and the consequent diminution in the CO_2 combined in the blood, the so-called alkali reserve, is one of the most important mechanisms the body possesses for preventing the rise in H ion concentration of the blood.

It is well known that the urine contains monosodium and disodium phosphates, although in the blood they are chiefly present in the red corpuscles. Acid is got rid of through the kidney by the conversion of the alkaline disodium phosphate into the acid monosodium phosphate, and by this process the hydrogen ion concentration of the urine is increased, though to nothing like the same extent as if the unaltered acid had been excreted in the free state. The phosphates act as "buffers," which damp down the effect of the addition of acid.

The third mechanism is in the formation of ammonia and its excretion combined with acid.

ALTITUDE AND EXERCISE.

One of the earliest investigations on acidosis in human beings was carried out by Barcroft [2] on the effect of altitude.

Ward [3] had shown previously by investigations on himself that on the top of Monte Rosa his alveolar CO_2 was lowered, and this effect persisted for many days after his return from the ascent. The explanation offered was that an acidosis was present, which required increased pulmonary ventilation. The beneficial effect of this was the fact that the oxygen pressure in the lungs was thereby increased; it was a mode of adaptation making it possible to exist in a rarefied atmosphere.

The actual acidosis was proved by Barcroft by means of the blood dissociation curve, described in Lecture II. He further showed by measuring the alveolar CO_2 that the acidosis was a compensated acidosis.

It has been already stated that the acidosis at high altitudes may be looked upon as a process of acclimatisation to enable the organism to live in a rarefied atmosphere. A good deal of attention has been paid to the nature of this acidosis

Ryffel showed it was not due to lactic acid. Hasselbalch [4] found in various people a sudden diminution in the ammonia excretion and an unusually alkaline urine as the immediate effect of reducing pressure in an airtight chamber. His explanation is that the acidosis is not due to the formation of a new acid, but that it is a relative acidosis due to deficiency of bases, brought about by the diminution in production of the endogenous base ammonia. This discovery provides a new outlook on the subject. Under conditions when an acidosis is favourable to the body, such as may occur in oxygen want, it may be deliberately brought about by diminishing the production of ammonia and making the urine more alkaline.

In the last lecture it was shown that in muscular exercise not only was there an acidosis, but the acidosis was uncompensated.

Barcroft has shown that the uncompensation becomes greater if the exercise is taken at an altitude. This acidosis has been shown by Ryffel to be due to the formation of lactic acid. Thus, it is a different type from that which the effect of altitude produces when the body is at rest.

PREGNANCY AND ECLAMPSIA.

The possibility that the normal process of pregnancy is associated with an acidosis was suggested independently by Hasselbalch and by Leimdorfer, Novak, and Porges. They found that the alveolar CO_2 was lowered.

The Viennese observers, as a result of work on 15 cases, claimed that the diminution in the alveolar CO_2 was one of the earliest signs of pregnancy.

A series of observations by Hasselbalch and Gammeltoft [5] on a case showed a distinct fall in the alveolar CO_2 on the first occasion when menstruation ceased, and the alveolar CO_2 fell gradually to 30 mm. just before the birth of the child.

The problem as to whether the fall in alveolar CO_2 was really due to an acidosis was settled by measuring the hydrogen ion concentration of the blood taken shortly before and after child-birth. In five cases the mean alveolar CO_2 before birth was 32·3 mm., and the mean value after birth was 38·1, a rise of nearly 6 mm.

The ph of two samples of blood taken before and after child-birth was determined, and at the corresponding alveolar CO_2 pressures the mean values were 7·43 and 7·44. This means that during pregnancy there is a fully compensated acidosis.

Hasselbalch and Gammeltoft observed a few cases of eclampsia.

The alveolar CO_2 was not measured. In two cases which were not very severe the fixed acidity was not abnormally increased; with 40 mm. CO_2 the values of ph were 7·38 and 7·36; the corresponding mean value for the five normal pregnancies was 7·39. In the two severe cases the values were 7·19 and 7·23, values so acid that the authors doubt whether the alveolar CO_2 would have been reduced sufficiently to compensate. Unless this had been the case the acidosis would have been uncompensated. Thus the cases resembled the condition in uræmia, to be described later.

RELATION BETWEEN AMMONIA EXCRETION AND ACIDITY OF URINE.

The relation between the ammonia excretion and the acidity of the urine has been recently investigated by Hasselbalch. [6]

As a general rule he found that an acid urine was accompanied by an increased ammonia excretion, and vice-versa. There is an obvious difficulty with regard to the ammonia excretion, and that is that the amount of ammonia formed depends, to a large extent, on the protein metabolism. He excluded this factor by using the ratio between the ammonia nitrogen and the total nitrogen expressed as a percentage.

If the ph of samples of urine passed at different times during the day on a mixed diet are measured the acidity is always diminished 3–4 hours after a meal, and increases again immediately after the meal. The maximum carbohydrate metabolism occurs 3–4 hours after a meal, and this diminishes the acidity. The latter has nothing to do with the reaction of the gastric juice.

The ammonia ratio always increases as the ph diminishes (i.e., as the acidity increases), and if the corresponding values for these two factors are plotted against one another, the points all lie on a rectangular hyperbola. The mean value for the ph of the urine is 5·8, and the corresponding ammonia ratio, "the reduced ammonia ratio," for normal people lies between 2·2 per cent. and 5·3 per cent.

This relationship is not altered by taking large quantities of water, salt, or dilute HCl, and is independent of diet. It is constant for the individual, but there are slight seasonal variations. In pregnancy, after severe muscular work, in fever, and in diabetic acidosis, the reduced ammonia ratio is increased and the ammonia figures corresponding to other ph's are correspondingly increased, the points still forming a hyperbola the position of which has been altered.

The increased formation of ammonia may be due to a specific formation of ammonia from protein, and this power of formation may well vary in different people. The object of the formation is obvious: it spares the alkali reserve of the blood, it prevents the unnecessary excretion of phosphates—the only other way in which acid can be removed from the blood.

ANÆSTHESIA AND SHOCK.

Emphasis has been laid on the fact that acidosis is accompanied by increased pulmonary ventilation, and conversely any case of hyperpnœa would suggest the possibility of an acidosis being present. It is remarkable in how many different conditions this has been proved to be the case.

In anæsthesia, particularly when open ether is used, the respiration is stimulated, and there is a fall in the alveolar CO_2. However, Morriss [7] has shown that under these conditions there is a diminution of the alkali reserve of the plasma, which indicates that some fixed acid is present in excess.

Yandell Henderson's well-known theory of shock attributed the condition to acapnia—a loss of CO_2.

* Lectures I. and II. were published in THE LANCET of June 22nd (p. 863) and 29th (p. 895), 1918.

Recent experiments of his[8] were carried out as follows. An anæsthetic like morphia was chosen which did not produce acapnia on its own account. The shock was produced by opening the body and handling the animal's intestines; a rapid fall in the alkali reserve was noticed, coinciding with the hyperpnœa. This would suggest that the acapnia was a secondary effect of the acidosis in this type of shock.

In other cases the hyperpnœa is presumably primary, such as the hyperpnœa associated with pain, but even in this condition a fall in the alkali reserve was noticed, and Henderson suggests that this acidosis is a secondary phenomenon to counteract the acapnia produced by the hyperpnœa. If no acid were produced the deep breathing would wash out the CO_2, and the individual might become asphyxiated owing to the removal of the CO_2, the normal stimulus to respiration.

Surgical shock can be produced in many different ways. Cannon has found that there is an acidosis present; but there is no proof that the acidosis is the cause of shock. It may be a compensatory mechanism to guard against acapnia, as Henderson has suggested; or a more likely explanation is that through failure in the circulation acid products are formed due to deficient oxidation, and these produce the acidosis, which is therefore the result of the shock and not its cause.

HEART DISEASE AND URÆMIA.

One of the most striking examples of dyspnœa is afforded by conditions of failing heart, whether it is the heart itself which is primarily at fault, as in simple valvular disease, or whether there is a renal element added to it, which forms a complex usually described as cardio-renal disease.

The first detailed investigation on this subject was carried out by Lewis, Ryffel, Wolf, Cotton, and Barcroft.[9] The subject is complicated because the separation of cases of this kind into different clinical groups is difficult.

The main conclusions of the paper, which Barcroft and Lewis[10] tried to confirm in a later paper, was that in cardiac failure from simple valvular disease there was no acidosis present, but that the dyspnœa was due to excess of CO_2 circulating in the blood. A further point was their refusal to define the meaning of the term uræmia, which they looked upon as too vague a term to be of any value.

Uræmia.

However, the term uræmia can be applied to, and should be restricted to, a very definite type of case in which there is retention of urinary products, and this retention can easily be determined by measuring the percentage of urea in the blood. There is evidence that urea is in itself poisonous, giving rise to drowsiness and coma associated with muscular twitchings.

Uræmia is roughly of two clinical types.

The commonest type is the case with fibrosis in the kidney and a high B.P., and during the attack the urea in the blood may reach a value of ten times the normal—i.e., 3 parts per 1000. If the patient recovers the urea falls, but owing to the damaged kidney it always remains higher than normal. The picture is the same whether the condition arises in the course of Bright's disease or whether it is due to sepsis in the urinary tract.

The second type is the uræmia of acute nephritis, and there may be here some other intoxication also present, due presumably to the acute infective process in the kidney. Though there is some retention of urea in acute nephritis, it is nothing like so great as in the fibrosed kidney,† and the probable explanation is that the body has accustomed itself to a large dose of urea in the blood in the latter condition.

The value of K by Barcroft's method was determined by Poulton and Ryffel[11] in four cases of uræmia in which the blood urea was about 10 times the normal concentration.

The alveolar CO_2 was low; there was an acidosis, and at the same time values for K suggested the hydrogen ion concentration was increased. Schlayer and Straub[12] had already observed that the alveolar CO_2 was diminished in uræmia, and had suggested there was an acidosis, but had not given any proof of it.

In order to get over the objection that the value for K may be affected by other factors than hydrogen ion concentration in pathological conditions, Donegan, Parsons, and Poulton‡ have investigated three other uræmic cases, measuring the hydrogen ion concentration of the blood directly.

In one obviously mild case, a man (urea in blood 0·46 per 1000, alveolar CO_2 of 31 mm., i.e., slightly reduced), with no perceptible hyperpnœa while sitting up in bed, there was a slight fully compensated acidosis. The ph at the alveolar CO_2 pressure was 7·40—a normal figure.

In a second man the urea in the blood was 0·54 per 1000, i.e., slightly raised, the alveolar CO_2 was 34 mm., and the ph was 7·39—again a slight compensated acidosis. The patient was walking about and feeling quite fit.

In a case of advanced uræmia, with the patient very dyspnœic and unconscious just before death, both the value for K (0·000056) and for ph (6·92) showed actual acidity. As far as I know, this is the most acid case that has ever been recorded. The urea in the blood was 4·0 per 1000.

The conclusion to be drawn is that in uræmia, when the dyspnœa at rest is marked, there is an uncompensated acidosis.

† However, Dr. Ryffel informs me that in two children with nephritis (ages 1 and 4) he has found quite high values for the blood urea.

‡ Not yet published.

Simple Cardiac Cases.

The remarkable feature about the dyspnœa of valvular disease of the heart is that in the milder cases, while the patient is quiet, the breathlessness is absent, but as soon as any exertion is taken the dyspnœa becomes obvious.

Peabody,[13] following Siebeck, explains this condition by the lowered vital capacity of the patient. This is determined by a spirometer. The patient inspires as deeply as possible and the total air consisting of a full inspiration and a full expiration is measured in the spirometer. In heart cases with failing compensation, much lower values are obtained than in healthy people, and the vital capacity becomes normal as the case improved. Dyspnœa on exertion will be due to the fact that in healthy people the pulmonary ventilation is increased without effort, but when the movements of the chest are restricted, as in heart failure, increased pulmonary ventilation will be difficult. This is probably only one factor in the dyspnœa.

Barcroft and Lewis[9 10] showed by means of the blood dissociation curve that in the mild type of case there was no acidosis. Peters,[14] later, came to the same conclusion, by determining the alkali reserve of the blood by Van Slyke's method.

Barcroft and Lewis argue from their results that in all cases of simple cardiac dyspnœa associated with valvular disease there is no acidosis.

But this is too sweeping a statement, because on analysing their cases it is found that it is only in the milder cases that the absence of acidosis is noted. This is shown by the following remarks from the two papers.[9 10]

Case 13 "was convalescent when the examination was made." Case 14 "had improved to some extent when the special observations were made." Case 15 "was convalescent." Case 7, "there was no distress, breath could be held 15 seconds." Case 8, "breath could be held 20 seconds." Case 9, "respirations were 25 per minute, but not distressed."

On the other hand, some of the simple cardiac cases did show a marked acidosis when the dyspnœa was severe, and, although Barcroft and Lewis considered that there was a renal element present, there was little evidence of this.

The following are examples:—

Case 2: Mitral stenosis, auricular fibrillation. "The breathing is very laboured and rapid; there is absolutely no reserve. P.M., kidneys show little change apart from congestion."

Case 5: Aortic disease and aneurysm; Cheyne-Stokes breathing. "Distress was considerable. P.M., kidneys congested, surface smooth, and capsules stripped easily."

Case 6: Aortic disease. "Breathing laboured, 40 per minute. P.M., kidneys congested, little or no fibrosis, epithelium swollen and granular."

The absence of any renal element was shown by the fact that the urea in the blood was not raised, and further microscopic examination did not show any extensive glomerular destruction. The albuminuria may be attributed to the renal congestion, which was always prominent in the case.

The conclusion to be drawn is that cardiac dyspnœa, if mild in degree—i.e., in the earlier stages of failure of compensation—is not associated with an acidosis, but that in serious cases an uncompensated acidosis occurs—i.e., the hydrogen ion concentration of the blood is increased.

This statement is borne out by a case of my own. T. H., a young man, was admitted on Jan. 9th, 1915, with rheumatic mitral stenosis and cardiac failure. The failure had been threatening for some months previously; his breathing was greatly distressed. He was relieved to some extent by venesection. Red cells 6,700,000 per c.mm., Hb 108 per cent., alveolar CO_2 23 mm. The blood dissociation curve at a pressure of 22·7 mm. CO_2 gave a K of ·000136. This case showed, a day or two before death, a severe uncompensated acidosis.

Cardio-renal Cases.

The remaining cases described by Lewis and Barcroft were not characterised by any obvious valvular lesion, and they were not cases of rheumatic heart disease.

They are perhaps usually described as cardio-renal cases. They all showed an uncompensated acidosis when the dyspnœa was severe. In only one case was the urea in the blood considerably raised above normal, when it was 1·07 parts per 1000. These patients were very prone to attacks of Cheyne-Stokes breathing. Six of the cases died and post-mortem examinations were made. In all these there was some evidence of myocardial degeneration, and all of them showed atheroma of the coronary arteries. In only two cases was there any extensive destruction of Malpighian corpuscles, and in one of these the blood urea was 0·4 per 1000 during life—i.e. slightly raised; in the other case the blood urea was not determined, but to judge from the appearance of the kidney it would have been high.

Hence in the majority of these cases there was not the same rise in the blood urea that was present in Poulton and Ryffel's cases, and so uræmia could not be said to be present.

The most characteristic point in the post mortems was the evidence of long-continued cardiac failure, the organs, particularly the liver, showing congestion and being enlarged. This, coupled with the myocardial changes, suggest that these cases are primarily failure of the cardiac muscle, and there is no reason to differentiate the nature of the uncompensated acidosis in these cases from the uncompensated acidosis present in the later stages of rheumatic and valvular heart disease. Doubtless in all cases of pronounced heart failure there are secondary changes in renal function.

Hale White, Ryffel, Poulton, Johnson, and Chisolm[15] investigated in considerable detail a case belonging to the same clinical group, but in which the Cheyne-Stokes breathing was extremely marked and lasted for weeks.

In this condition there is a considerable variation in the composition of the alveolar air at different periods in the respiratory cycle, a- was first described by Pitt, Pembrey, and Allen.[16] Just at the end of the apnœic period the CO_2 pressure is highest, while the oxygen pressure is lowest; at the end of the dyspnœic period the condition is reversed. The result is that the respiratory centre is, at the end of the apnœa, supplied with blood containing CO_2 at 30 mm. pressure and at the beginning of the apnœa the CO_2 pressure in the blood has fallen to 16 mm.

Two determinations of K were made. At 16 mm. CO_2 K was 0·000261, which is a normal value, and at 30 mm. K was 0·000157, a value much more acid than normal. Hence, when the respiratory centre was being supplied with abnormally acid blood respiration started, whereas when the acidity was reduced to normal respiration stopped. The conclusion follows that in this case of Cheyne Stokes respiration the respiratory centre had a diminished excitability, because it only reacted to a more acid blood than normal and ceased acting when the hydrogen ion concentration was normal.

The urea in the blood was about three times the normal—0·75 per 1000. The lactic acid in the blood was not increased.

Post-mortem examination showed a nutmeg liver; the kidneys showed arterio-sclerotic changes, but the glomeruli were normal. The dorsal nucleus of the vagus showed advanced chromatolysis and atrophy of the cells; this is interesting, as this nucleus is regarded as the respiratory centre, and the patient had Cheyne-Stokes respiration. However, Johnson has found similar changes in all cases where there has been a terminal dyspnœa of some days' duration; so the significance is doubtful.

Two Types of Case.

A summary of these conditions is as follows. There are two distinct types of case—the uræmic with the high blood urea and the case showing simple cardiac insufficiency. The uræmic case tends to show acidosis in quite an early stage, and this is compensated to start with. In the final stages the acidosis is uncompensated, and extremely acid values may be found. In the later stages of simple cardiac failure there is an uncompensated acidosis. The cardio-renal case is usually a mixture of both these types. There is often obvious cardiac failure and the blood urea is raised to some extent. In the cardio-renal case there is often another independent condition—viz., the liability to Cheyne-Stokes respiration. This is due to a diminished excitability of the respiratory centre, which is probably due to sclerosis of the arteries supplying the centre, so that there is some failure in the supply of blood to the centre.

Nature of the Acidosis.

What is the nature of the acidosis?

It certainly is not lactic acid, and so far no other acid has been found. If it is permissible to speculate, I would point to the analogy of the acidosis observed at high altitudes, which is brought about by a diminished production of ammonia and has the object of providing the body with a larger supply of oxygen by greater ventilation of the lungs. It may very well be that a similar state of things occurs in severe cardiac dyspnœa. There is a call for more oxygen, and an artificial acidosis is created to supply the demand.

Cause of Uncompensation in Later Stages.

Why does this acidosis become uncompensated in the later stages?

It may be that lack of oxygen renders the respiratory centre less sensitive to CO_2, and so the hydrogen ion concentration increases, or the acidosis may become so great that it is impossible to excrete the CO_2 sufficiently quickly to keep pace with it. This second explanation is difficult, because in diabetic coma the alveolar CO_2 falls much lower than in cardiac dyspnœa, and yet the acidosis still remains compensated.

There is yet a third possible explanation.

Hooker, Wilson and Connett[17] have shown by animal experiment that CO_2 has a specifically greater stimulating effect on respiration than other acids—e.g., HCl. For a given H ion concentration the pulmonary ventilation was greater if the acid was CO_2 than if it was HCl.

In uræmic acidosis there is a diminution in the CO_2 and an increase in fixed acid. Hence the mixture will be less stimulating, and a higher H ion concentration will be required. It follows that an increasing acidosis will become more and more uncompensated. Diabetic acidosis apparently provides a difficulty, because even in severe stages the acidosis remains compensated. But it will be remembered that there is evidence that the aceto-acetic ion is itself a specific stimulant to respiration, and if its action is equal to the CO_2 it will make no difference if there is an increase of aceto-acetic acid and a decrease in CO_2. The stimulating action will remain the same, and however great the acidosis it will still remain compensated.

The specific stimulating action of CO_2 may provide the explanation of the great difference found in pulmonary ventilation in the most serious cases of dyspnœa, and the pulmonary ventilation in muscular work.

It is rare to find a higher pulmonary ventilation in disease than 20 litres per minute. The normal at rest in bed is about 6 litres. In muscular work enormous values of 60 or 80 litres per minute are obtained. It may be the specific stimulating action of CO_2 that admits of these huge ventilations taking place in muscular work.

ACIDOSIS IN OTHER DISEASES: GAS GANGRENE.

Acidosis has been described in various other diseases.

In septic febrile states Fridericia and Olsen[18] showed that the alveolar CO_2 was diminished. They inferred that an acidosis was present; but there is no proof without measurement of the alkali reserve.

Rogers[19] has described an acidosis in the uræmia of cholera, which is to be expected.

Barcroft and Lewis[19] showed the presence of acidosis in pneumonia, in a case of pneumothorax and exophthalmic goitre with distressed breathing, and in a case of paroxysmal breathlessness.

Wright and Fleming[20] have published results indicating the existence of an acidosis in gas-gangrene patients and advocating injections of sodium bicarbonate as a therapeutic measure.

Joffe and Poulton§ have investigated the subject by observations on puppies infected with *Vibrion septique*. Oxyhæmoglobin dissociation curves at a constant pressure of CO_2 (37 mm.) were determined before and after the infection. No acidosis was found in the blood when the animal was constitutionally severely affected, but there was some definite acidosis in the blood taken from one animal immediately after death.

Wright used two methods:

He titrated the serum of gas-gangrene patients with standard acid, and he measured the hydrogen ion concentration of the serum by Marriotte's method after the CO_2 had been shaken out of it. Both methods give a measure of the fixed acids of the blood, which is increased in acidosis. Neither of the methods gives the hydrogen ion concentration of arterial blood—i.e., the blood at the alveolar CO_2 pressure.

There is no doubt about the acidosis Wright and Fleming found in their patients, and in addition many of them showed the hyperpnœa that would be expected. The main problem is to determine its importance, and in this question the knowledge of the effect of sodium-bicarbonate injections will be of value.

Wright used solutions of 500 c.cm. containing 5 per cent. sodium bicarbonate. In many cases the immediate effect of the solution was all that could be desired; the patient, although cold and pulseless, revived. An operation could often be performed, but death occurred in the majority of cases some hours later, very often in spite of a second injection of sodium bicarbonate. The authors themselves are not by any means enthusiastic about the treatment.

There is one other piece of evidence on this subject:

That is from Bull's recent work[21] on the preparation of the toxin from the bacillus of Welch, which he used in preparing his antitoxic serum. The acidity produced by the growth of the organism bears no relation whatever to the virulence of the culture.

These views bear out Joffe and Poulton's results, which indicated that the acidosis was a terminal result of the infection, and was not probably of much significance. It is impossible to help feeling that equally good results would have been obtained by Wright and Fleming if they had given intravenous injections of some neutral salt instead of sodium bicarbonate. Similarly it might be suggested that the equally brilliant results obtained occasionally in diabetic coma would also have followed a saline injection. In fact, Hilton Fagge published one such case. At the same time it must be admitted that when an acidosis due to production of acid has been proved the most rational method to adopt, if intravenous injection is assured, is to add some alkali to the fluid.

CONCLUSION.

And now the time for these lectures is drawing to a close. The attempt has been made to explain acidosis in two ways. It is either the result of increased production of acid, when the body uses the means at its disposal to compensate for its presence, and so prevent the rise in hydrogen ion concentration of the blood; or acidosis is of itself of benefit to the organism and is deliberately produced by the organism by modifying the action of the kidneys and liver—i.e., the formation of ammonia and the excretion of alkali.

These two types of acidosis will be similar to one another in the fall of the alveolar CO_2 and of the alkali reserve of the blood. They will differ from one another in the character of the urine. In one case the ammonia and the acidity will be increased, and in the other both will be diminished. Acidosis may be expected whenever the ventilation of the lungs is increased, and it is difficult to believe its existence except to a minute extent when there is no altered respiration. It is a very common condition and seems often to occur as a terminal phenomenon just before death. This was shown by Whitney, who found a blood acidosis in most cases after death, and particularly in those cases which had suffered from some infection.

Acidosis has been invoked as an important factor in certain diseases—scurvy, skin diseases, rickets. In the last-named condition it has been gravely suggested that the acidosis dissolves the lime salts from the bones. This would obviously be impossible without a rise in hydrogen ion concentration in the tissue fluid surrounding the bones. In

§ Not yet published.

none of these conditions is there trustworthy evidence that an acidosis exists; in fact, from the absence of respiratory symptoms its presence is extremely unlikely.

The last 10 years have made a great difference in our knowledge of the subject, but even now it is hardly out of its infancy. Workers of many nations have contributed to the advance. I do not think that we in this country need be ashamed of the share we have had in it. There are three names to whom before all others the modern conception of acidosis is due. They are Hasselbalch, of Copenhagen, and Haldane and Barcroft, of the Oxford and Cambridge schools.

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THE

ABSENCE OF THE *BACILLUS INFLUENZÆ* IN THE EXUDATE FROM THE UPPER AIR-PASSAGES IN THE PRESENT EPIDEMIC.[1]

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Is the present widely spread epidemic one of influenza or is it something new?

In recent years influenza has been only endemic, hence there has been little opportunity to study its causative organism by modern laboratory methods. The last great epidemic began about 1889, and lasted until about 1892. It rapidly spread over the civilised world. The present epidemic is also widely spread. Several camps have experienced it. A few weeks ago the —— area began to have cases. It rapidly spread through bodies of men. One reserve battalion had about 8 per cent. of its men develop the symptoms during 36 hours. Another reserve had 300 cases in four days. One camp reported an average of 40 cases per day for 12 days. Up to the present in the areas covered by this laboratory there have been about 1000 cases.

Symptoms.

Clinically the disease simulates influenza. It is an acute febrile infectious condition of three or four days' duration. The most striking symptoms are: Sudden onset with chills, severe headache with pain in cervical, dorsal, and lumbar regions, also pain in limbs and general malaise. The face is somewhat flushed and herpes labialis is to be noticed in a few cases. The fever soon attains its maximum, which varies from 99° to 102°. Several cases were observed in which the maximum temperature was 103° to 104°. Usually the highest point is reached on the second day, then follows an abrupt crisis, and on the fourth day the man feels practically normal. Many cases develop a cough, harsh in nature, with a thick sputum, scanty in amount and constant in appearance. It is not the greenish sputum of influenza proper, but is of a white mucoid nature. The urine is somewhat scanty, the appetite poor, and the bowels are constipated.

It will be noted: (1) That the pyrexia is of shorter duration; (2) that the total course of the disease is shorter; (3) that the gastro-intestinal symptoms are slighter than in the form of influenza due to the *Bacillus influenzæ*, commonly called Pfeiffer's bacillus. It is also noteworthy that convalescence is rapid and that as yet we have noted no cases of relapse, recurrence, or of complications. It must be remembered that the cases under our observation were young healthy soldiers in prime physical condition.

[1] A paper read before the —— Area Medical Society on July 2nd, 1918.

Owing to the rapidity of the spread we had no doubt that the causative organism was carried in the upper air-passages and that the infection was passed on by direct personal contact, drinking utensils, &c. This laboratory undertook an investigation of the epidemic.

Results of Laboratory Investigation.

The following examinations were carried out in 20 cases: (1) Urinary examinations; (2) leucocyte counts; (3) leucocyte differential counts; (4) blood cultures; (5) bacteriological examinations from naso-pharynx, throat, and sputum. The following are the results.

Urine.—Somewhat scanty and typically febrile, with a fair diminution of the chlorides; otherwise normal.

Blood counts.—Contrary to our expectation, we found that there is very little leucocytosis, the highest being 13,000 per c.mm., the average being 8000 per c.mm. The highest polymorphonuclear proportion was 60 per cent., the lowest 35 per cent., the average 47·5 per cent. We found that there was present a proportional lymphocytosis, the highest being 60 per cent., the lowest 32 per cent., the average 43·6 per cent. The blood picture is one of very little, if any, leucocytosis, with a decided increase in the relative number of small lymphocytes.

Blood cultures.—These all proved sterile.

Bacteriological examinations.—These were very interesting. We observed in all the cases studied that direct smears from the naso-pharynx, throat, and sputum contained among the organisms present one which was in outstanding predominance. It was a very small Gram-positive diplococcus, distinctly flattened on its apposing sides. Some of these smears contained no other organisms. In no smear examined were we able to discover the *Bacillus influenzæ*.

Cultures were made in these 20 cases from the two locations mentioned and from the sputum. Legumin serum agar plates were used. All the plates showed among other colonies one sort which was exceedingly abundant. In fact, in a few naso-pharyngeal plates it was in pure culture. In all the plates this colony was present vastly in excess of any other. It is a small, transparent, granular colony, strikingly like that of streptococcus. In each plate it proved to be composed of the same organism that we had noted in the preliminary direct smears. From no plates were we able to obtain colonies of *Bacillus influenzæ*.

It may be contended that this is due to the fact that we did not use media containing whole blood. It has been our experience that *Bacillus influenzæ* grows abundantly on legumin serum agar. We frequently obtain it when making routine bacteriological examinations from the naso-pharynx.

This diplococcus, we find, grows with reluctance on ordinary media. It prefers those containing serum. Hæmoglobin also accelerates its growth. It grows abundantly on Löffler's blood serum, legumin serum agar, blood agar, and in bouillon containing a little blood. On blood agar plates there is no hæmolysis, but in blood bouillon the erythrocytes appear broken up. The organism does not split either dextrose, lævulose, maltose, lactose, saccharose, or mannite. It has a slight tendency to anaerobic growth, and in fluid media containing blood a distinct tendency to chain formation.

When inoculated intraperitoneally it proved non-pathogenic to mice. The temperature of some was raised slightly for 24 hours. They showed a slight but distinct roughening of the hair. These reactions, however, might very well be due to the introduction of foreign protein. Further animal inoculation is being undertaken.

It will be noted that we found this organism in universal predominance and that we were able to cultivate it in the laboratory, thus fulfilling Koch's first two postulates. His final postulate we have not as yet, however, fulfilled.

Conclusion.

In conclusion, we wish to point out that although this epidemic has been called influenza for the want of a better name, yet in our opinion it cannot properly be considered such for the following reasons:—

1. The clinical course, though similar to that of influenza, is of very short duration, and there is, so far as we have observed, an absence of relapses, recurrence, or complications.

2. The present epidemic is not characterised by a sharp leucocytosis and polynucleosis, but rather by a very slight leucocytosis with a proportional lymphocytosis of the small mononuclear variety.

3. The organism of influenza—viz., *Bacillus influenzæ*—was in all cases absent and there was present with no exception a Gram-positive diplococcus.

Of course, it has long been recognised that attacks of so-called influenza are often due to organisms other than the *Bacillus influenzæ*. Many have been indicated. The purpose of our work was to determine the causative organism of the present epidemic. We consider this to be the above-mentioned diplococcus.

ON SOME UNUSUAL FORMS OF EPIDEMIC DISEASE.[1]

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GENERAL REPORT BY DR. A. K. CHALMERS.

DURING May several incidents combined to direct attention to the occurrence of certain forms of illness associated in some instances with severe nervous symptoms and a high rate of mortality. These were isolated in their occurrence, but almost contemporaneous with certain other cases which were definitely grouped in places of employment and in residential institutions. Some of these were probably influenzal in character, while others assumed the clinical features of the Abercromby Street School outbreak of 1888.

Coincident with these occurrences the number of deaths registered in the first fortnight of May rose to 886 in place of 663 in the preceding fortnight and the rate to 20 in place of 15 per 1000. The largest increase in the grouped causes of death was ascribed to cerebral hæmorrhage and respiratory disease and the chief incidence was at ages under 25.

At this period the press was reporting cases of botulism (a form of food poisoning), and three cases admitted to the fever hospitals under other names (typhus and cerebro-spinal fever), together with one seen by Dr. Picken in consultation, presented some of the features elsewhere ascribed to this affection, but without any association with food, as a likely explanation of the illness.

Results of Investigations.

In view of these circumstances Dr. Picken conducted an inquiry into the isolated cases, and Dr. MacLean into the grouped industrial and institutional cases. These latter mostly occurred in Lanarkshire, but had relationship with certain antecedent cases in Glasgow.

In the inquiries beyond Glasgow he was associated with the public health staff of the county.

From both reports (which are appended) it seems likely that we are dealing with at least two types of affection of the nervous system apart from influenza.

In the cases investigated by Dr. Picken nervous symptoms were a predominant feature. Sometimes they took the form of rigidity of certain groups of muscles, chiefly of the arms or legs. In some the rigidity was followed by paralysis; in others paralysis occurred without any antecedent rigidity. In two cases the paralysis was facial and produced the mask-like expression associated with botulism, in others the paralysis more obviously affected the limbs as in ordinary infantile paralysis. In a few the onset was sudden, but in the majority the symptoms developed gradually but rapidly. Altogether 11 cases in this group have been recognised [2] and 5 died within 5, 6, 8, 11, and 24 days respectively.

In Dr. MacLean's inquiry the majority of the cases occurred among groups of workers in industrial establishments. All these cases were of a mild type, characterised by sudden onset, severe headache, prostration, and rapid recovery, usually within 2–4 days. This group contained 420 persons and the symptoms suggested influenza.

But there were further groups occurring in institutions beyond Glasgow which receive inmates from a working boys' home in Oak-street where 16 cases with symptoms similar to those of the factory-workers occurred. The institutional cases, however, were not all equally mild, and eight deaths are known to have occurred among them.

Nature of Infection: Preventive Measures.

Excluding the influenza element, we would seem to have to deal with a form of affection which attacks the central nervous system, alternately the brain or cord, and falls within the group of affections for which the name Heine-Medin (a combination of the names of two observers of outbreaks last century) has been adopted. Of these the form best known is where the cord is the chief seat of the disease (infantile paralysis or poliomyelitis), of which the outbreak in New York in 1916 is probably the most recent on a large scale. It is possible, as Dr. Picken suggests, that the form simulating "botulism" is an aberrant form of this, chiefly affecting the brain, and indeed in some parts of France where it has been recently present it has been called "lethargic encephalitis" to distinguish it from the more commonly recognised affection of the cord and as possibly due to a separate cause. In any case it would appear to be an affection of the grey matter of the brain as distinct from disease of the corresponding portion of the cord.

The precise methods of spread are somewhat obscure. The occurrence of isolated cases has suggested the agency of insects, and the stable fly has come under suspicion.

With regard to preventive measures, it would seem obvious that the best defence of the population against the spread of the disease lies in a rigid attention to the details of personal and domestic cleanliness, including vigorous action against vermin and insect pests of all sorts. The disease tends to increase during warm weather, and court and stair cleansing and the frequent removal of stable litter should be rigorously enforced.

In order, also, to bring the attendant conditions of each case under review there would be advantage in including both forms of the disease within the Notification Act. Poliomyelitis has been notifiable in England since 1912, but the resolution should include the aberrant brain form known as polio- or lethargic encephalitis.

[1] Report submitted to the Glasgow Committee on Health, June 26th, 1918.

[2] Subsequent information adds to the number.

POLIO-ENCEPHALITIS AND AN EPIDEMIC DISEASE OF OBSCURE ORIGIN.

BY DR. R. M. F. PICKEN.

During recent months cases of a disease which was at first regarded as botulism, a form of food poisoning, but is now generally believed to be polio-encephalitis, an aberrant form of acute anterior poliomyelitis, were reported in various parts of England. The Department was alive to the possibility of the disease appearing in Glasgow, and at least two definite cases fall to be reported.

The First Case.

On Sunday, May 5th, Dr. Picken was asked to see a patient in Ibrox in consultation with a practitioner. This patient, a girl aged 19, first complained on April 18th of dizziness and shivering, associated with stiffness and pain in the arms and legs. She was able to continue at work until April 23rd, when the general symptoms became more severe and the doctor was called in. On April 26th she was confined to bed, and on the 27th sickness and vomiting occurred. Her temperature now became elevated, and on the 29th she was delirious and fell into a semi-comatose condition, in which state she remained at the date of examination.

When examined her appearance was notable, the most striking feature being the complete absence of expression on the face and of ability to move the facial muscles. The eyes were almost closed and apparently incapable of being further opened, and the mouth was hanging open, the muscles of the jaw being paralysed. She moved very little, but was able to respond to questions put to her by her relations. There appeared to be a slight degree of paralysis of the left arm and leg. There was marked constipation. The patient had difficulty in swallowing.

So far the symptoms corresponded generally with those of botulism, but the absence of paralysis of the muscles of the eyeball and an excessive moisture in the mouth in contrast to the dryness of the mouth in botulism indicated that the diagnosis might lie in a different direction. This patient was removed to the Royal Infirmary on May 6th, where she is making a gradual recovery. The symptoms, the gradual onset of the disease and its subsequent course, point to a diagnosis of polio-encephalitis.

The Second Case.

A man, aged 35 years, was admitted to Belvidere Hospital on May 6th as a case of typhus fever, and was reported as such to the committee at the meeting on May 8th. The course of his illness, however, and the post-mortem findings (he died on May 9th) indicate that this also was probably a case of polio-encephalitis. In this instance the onset of illness on May 1st, as reported by Dr. W. Archibald, was more sudden than in the case above reported. It commenced with headache, sickness, stupor, and delirium, the latter appearing early and persisting throughout the illness. In this case also, although it was somewhat difficult to establish, there was evidence of facial paralysis and the expressionless appearance of the face was particularly pronounced. Prior to death there was a definite paralysis of the upper eyelids. In other respects this patient presented features differing from the previous one. Paralysis of the muscles of the eye was present and there was a greater degree of stiffness of the muscles of the body, which in his case was a very marked feature. The skin was hypersensitive.

Post-mortem examination was made by Dr. R. M. Buchanan, who reported evidence of a generalised toxæmia, and in particular a condition of the brain and spinal cord which indicated an inflammatory condition of these organs.

In the former case there was definite history of the consumption of tinned foods, and especially of tinned salmon, but those articles of diet had been shared by the other members of the family, none of whom

took ill. In the second case there was no history of such dietary and there was again an absence of symptoms in the other members of the patient's family.

Other Cases.

In addition to the two cases described in detail, two patients admitted to Ruchill Hospital—one as a case of cerebro-spinal fever, on April 26th, who died on April 27th, and another also admitted as cerebro-spinal fever on May 18th, who died on May 20th—presented cerebral symptoms differing from those of cerebro-spinal fever or any other type of meningitis, and the post-mortem examinations carried out by Dr. Buchanan revealed conditions similar to those described above. These cases had also no association with similar illness in the other members of their families, and conform fairly closely with the descriptions of polio-encephalitis, although the onset of the disease was more than usually sudden.

There is reason to believe, therefore, that cases of this unusual disease have been occurring in Glasgow, and probably many of them have been regarded as suffering from some other more familiar disease, since three of the four cases mentioned came under our notice as the result of mistaken diagnosis.

Dr. Leonard Findlay, of the Royal Hospital for Sick Children, reports the occurrence of six recent cases of disease affecting the nervous system, three of which at least appear to have been typical poliomyelitis, while others agreed more or less closely in symptoms with the cases already described.

OUTBREAK OF AN ACUTE FEBRILE DISEASE IN THREE FACTORIES AND AN INDUSTRIAL SCHOOL IN GLASGOW.

BY DR. A. MACLEAN.

During the first week of May of this year an acute febrile disease with symptoms resembling those of influenza invaded three factories and one industrial home for boys in Glasgow. The three factories accounted for 420 cases, the industrial school for 16. The disease was of a very mild type, and was characterised by sudden onset, severe headache, prostration, occasionally extreme, and rapid recovery usually in 2–4 days. Less frequent symptoms were nausea, shivering, and, very rarely, sore-throat.

No deaths, to our knowledge, occurred, and in no instance do we know of a medical practitioner being consulted.

The significance of this mild outbreak revealed itself when it was brought to our notice that a similar outbreak, attacking some 280 persons, had appeared in two industrial schools, a public school, and a hosiery manufactory in the county of Lanark. The greater number of cases in the county presented the same symptoms as the Glasgow cases, but a few had pulmonary symptoms, and there were 8 deaths —7 from one industrial school and 1 from another. The Glasgow outbreak occurred fully a week before it appeared in the county, and it has been ascertained that a boy resident in the infected industrial home stayed at the Lanarkshire Orphanage from May 10th to 15th, the first case occurring there in the person of the boy who slept in the same dormitory. Further, there is constant communication between this Glasgow home and a Lanarkshire school, where there were 80 cases and 1 death.

Similar outbreaks have occurred at intervals in several industrial schools throughout the country.

In 1888 the late Dr. J. B. Russell made an exhaustive report on an outbreak which occurred in St. Mary's Roman Catholic Industrial School, Glasgow. The Scottish Office caused a report to be published of an outbreak in St. Joseph's Industrial School, Tranent, in 1911. Others have been reported as occurring in various industrial schools in England. This is the first occasion, however, in which factories or works have been invaded by the disease.

Reviewing the published reports of previous epidemics, the Lanarkshire cases, some of which have been seen by us, and the history of the Glasgow cases, it is evident that we are dealing with the same disease, of which the following is a broad description.

Nature of the disease.—It is an acute febrile disease resembling in its mild form influenza, and usually diagnosed as such. When associated in an epidemic with the severe and fatal cases, it is evident that we are dealing with a disease quite distinct from influenza. This is further borne out by the bacteriological findings.

Types and symptoms.—Three types of the disease may be recognised, all sometimes occurring in the same epidemic, but these types frequently merge into one another.

1. *The mild non-pulmonary type (usual type).*—The onset is sudden, headache and prostration being the chief symptoms. There is feverishness, the temperature varying from 99° to 103° F. The recovery is rapid, usually occurring on the second, third, or fourth day. Less frequent symptoms are nausea and vomiting. Sore-throat is a rare complaint.

2. *Malignant type.*—Onset is sudden, coma, varying occasionally with delirium, rapidly supervenes, and death takes place frequently in less than 24 hours.

3. *Pulmonary type.*—The symptoms are similar to those of the first type, but symptoms of pulmonary involvement, with breathlessness and sometimes cyanosis, are superadded. Congestion, œdema, or consolidation of the bases of one or both lungs may occur.

The absence of nervous symptoms—e.g., ptosis, Kernig's sign, strabismus, pupillary irregularity, &c.—is a noteworthy characteristic in this and previous epidemics.

Pathology.—The pathology of the disease has not been completely worked up. Generally speaking, there is congestion of the membranes of the brain, but no meningitis, congestion with œdema, and sometimes consolidation of the bases of the lung, congestion of the mucous membrane of the stomach and upper part of small intestine, enlargement of the solitary glands, Peyer's patches, and mesenteric glands, occasionally enlargement and congestion of the spleen. These post-mortem findings bear a certain resemblance to those of epidemic poliomyelitis, which is of significance, inasmuch as the clinical symptoms are not unlike those occurring in the non-paralytic, a fairly common type of this disease.

Bacteriology.—This has not been completely investigated. Two important points, however, have transpired. The bacillus of influenza is invariably absent. This is in accordance with the clinical picture of the disease. A Gram-negative diplococcus resembling the pneumococcus has frequently been obtained from the nose, throat, lungs, and membranes of the brain.

A CLINICAL STUDY OF CRANIOTABES.

BY EDMUND HUGHES, M.R.C.S. ENG., L.R.C.P. LOND.,
LIEUTENANT, R.A.M.C. (TEMP.).

IF the various modern accounts of craniotabes in infants are analysed and compared they will be found inexact and often discrepant. Further, it has not been possible to derive from them any clear conception of either the time-incidence of craniotabes or the manner of its development and retrogression. Without information of this sort, however, the physician who meets with a case is clinically sightless. He can have no intelligent grasp of the fact when observed, and can make no discriminating use of it. I therefore undertook a fresh inquiry into the subject. The following statements are based largely on a close study of 94 cases, extending over the past four years, and reinforced and controlled by much other material. The work having had to be put aside in an incomplete stage, it has seemed none the less worth while making a brief statement of some of the findings to date, together with certain argument based upon them.[1]

Some Peculiarities of Healthy Immature Skulls.

To avoid confusion with other cranial defects at the same age whose causation may be different,[2] I shall limit the term "craniotabes" to denote the process described in this paper. Certain peculiarities of healthy immature skulls must be understood, or they may be mistaken for craniotabes proper.

Thus, if the skull of a healthy fœtus aged, say, 4½ to 5 months be examined *in situ* while in the fresh state, moderate pressure on the flat cranial bones will be found to produce deformation along their borders. The depression thus caused is shallow, roughly parallel with the edge of the bone, having relatively smooth margins which merge insensibly into the more ossified parts. If the parietal be next removed and examined, it is found firmly ossified, except for a broad even margin all round. This margin, though already tough, is flexible, forming when bent a smooth curvation without "buckling." By the twenty-eighth to thirtieth week this margin has normally become inflexible, in the sense that moderate pressure upon it is insufficient to cause yielding, but results merely in a tilting inward of the whole bone. By full term, *a fortiori*, all such attempts at indentation are unsuccessful.

The only exceptions to this appear to be as follows. In a majority of infants born at term, and for a varying number of weeks afterwards, a slight yielding occurs on *firm* pressure on the tip of the postero-lateral angle of the parietal, usually also on the closely adjacent portion of the occipital; and at the site of the parietal foramina (i.e., from ½–1½ inches in front of the posterior fontanelle). A sagittal foramen may, of course, replace these foramina, and exists, according to Broca's figures, in about 1 in 4 skulls. When the sagittal foramen is large, it is associated with widening of the interparietal gap posteriorly and of the posterior fontanelle.

[1] A well-informed summary of the knowledge existing on the subject when the present inquiry was begun will be found in the text-book of Garrod, Batten, and Thursfield, 1913, Art. "Craniotabes."

[2] A curious case recorded by Ballantyne (Ante-natal Pathology, 1902, p. 337) reads like a greatly exaggerated instance of the fœtal form of craniotabes, with delayed re-ossification.

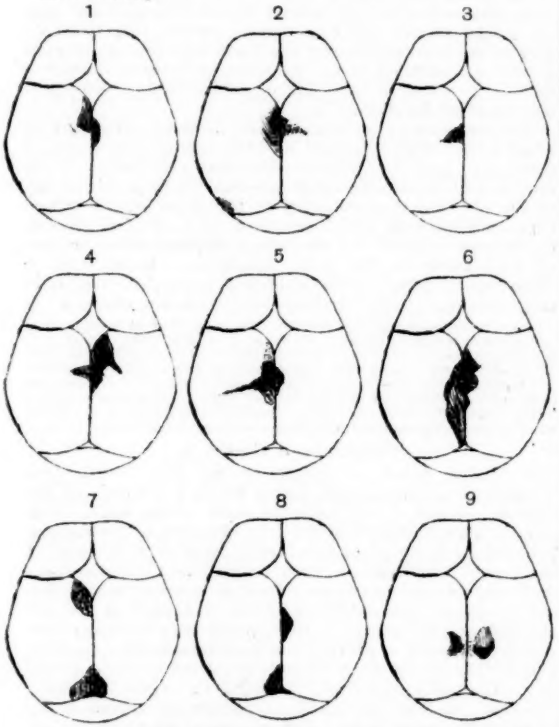
Out of a large number of skulls examined at viable ages, I have found but few which showed a remnant of the even marginal flexibility of the early fœtal bone. If present at all, it is limited to the extreme edges of the bones formed in membrane, and requires decidedly firm pressure to bring out.

The above normal sites of exception to the otherwise general firmness of these bones are readily distinguishable by their situation, their symmetry, and the degree of pressure required to disclose them.

Fœtal Craniotabes.

FIG. I.

The situations shown in Figs. I. and II. are approximate, not to scale, and transcribed from graphic records carefully made at time of observation. The amount of shading expresses relative degrees of loss of elasticity.



Among the population on which my observations have been made, an indefinite though probably no small number of infants born at or near term show true craniotabes at birth. Thus in 153 consecutive births I found craniotabes in 30, or about 1 in 5. This, which may be called "fœtal or primary" craniotabes, has the following characters and conditions: (1) it is asymmetrical, and elicited with slight to moderate pressure; (2) it is found only in vertex presentations; (3) it occurs nearly always in close relation with the sagittal suture[3]; (4) it is habitually followed, after a varying time, by craniotabes of the type recognised and described as such.

The situation of these areas of true fœtal craniotabes is best realised by means of illustrations. In Fig. I. are shown nine different representative sites, selected from observed instances. The amount of softening in craniotabes is conveniently expressed in terms of 4 degrees, which the palpating finger can distinctly recognise. The first degree implies that moderate (never forcible) pressure is required to elicit it. The third degree is that requiring very light pressure; the second degree being intermediate. These three degrees imply the capacity of the bone to recover its shape. In the fourth degree the bone has lost all resilience, and the area is membranous. In these fœtal cases all four degrees may be found in different examples, and even in different parts of the same individual bone. In respect of amount of elasticity, therefore, fœtal craniotabes strictly agrees with that of later ages.

The same agreement holds good with regard to irregularity and asymmetry. In some the sensation imparted to the finger is identical with that given by areas of later origin which are known to be rather slowly hardening, suggesting that some infants are born with remnants of areas formerly more extensive.[4]

After birth the fœtal area hardens or undergoes modification, according to its site. In many instances these patches, which often commence about 2 cm. behind the anterior fontanelle, lie between this and the region of the sagittal or parietal foramen, and so are no longer subject to pressure. A chance is then afforded of ascertaining the rate of healing of a craniotabetic area when suddenly and completely withdrawn from pressure. This, of course, will partly depend on its degree at birth. The shortest time my observations give for the area to become indistinguishable from the surrounding bone is 15 days. The commonest time was from four to five weeks. Some last considerably longer and are still detectible in the twelfth week. The hardening proceeds progressively and evenly, never in irregular patches.

Postnatal Craniotabes.

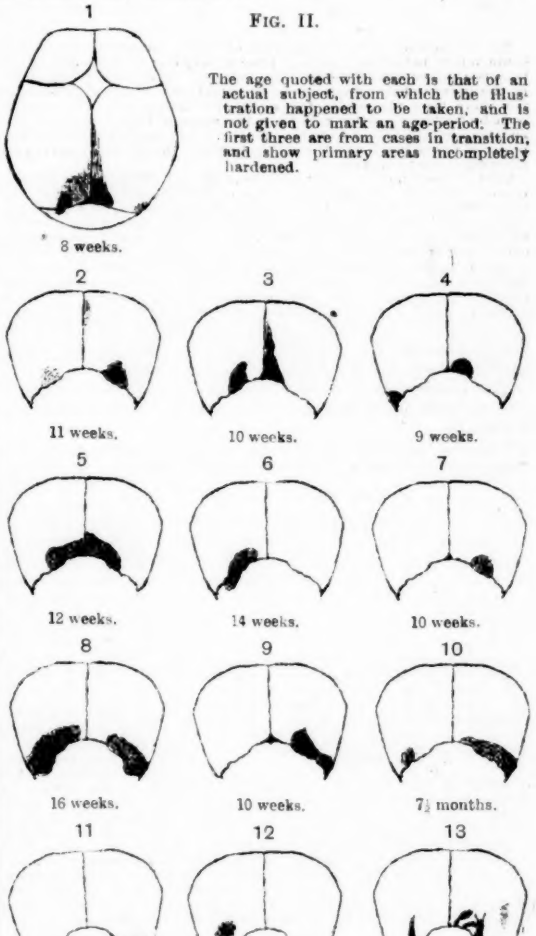
The "postnatal or secondary" area may first become evident towards the end of the first month of extra-uterine life.

It is thus not uncommon for fœtal and postnatal areas to be present on the same skull during the second month. My evidence indicates that the more advanced or extensive the fœtal areas the earlier and more widespread the formation of postnatal areas, and that the milder the former condition the slower and less complete the formation of the latter, though both these rules have exceptions. It will follow that, in the second case, there will be an interval of time during which no craniotabes is present. This circumstance, together with the difficulties of continuously observing some cases, prevents me from formulating the following rule without its qualification. It may, however, be truly posited that *craniotabes, according to its site, may be expected to be followed by, or to have been preceded by, craniotabes in other situations.*

In Fig. II are shown 13 common situations in which postnatal areas may be looked for.

FIG. II.

The age quoted with each is that of an actual subject, from which the illustration happened to be taken, and is not given to mark an age-period. The first three are from cases in transition, and show primary areas incompletely hardened.

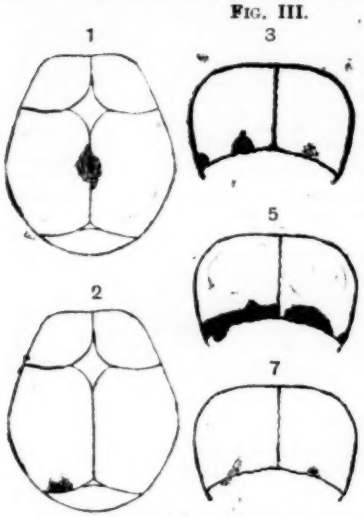


[3] Rarely, a marked softening of the postero-lateral angle of one or other parietal will be found along with vertex craniotabes in the new-born. The only case observed by me showing an exceptional site alone was the premature child of a woman who spent her seven months of pregnancy lying on her back or partly on her side through severe chronic arthritis. The child, who presented in the first position, showed a small discrete area on right parietal above midpoint of lambdoid suture. Large postnatal areas developed later on both parietals.

[4] The examination of the new-born for craniotabes should be repeated on the third or fourth day to allow time for œdema of the scalp to pass off. I have known this to mask smaller areas of softening.

Fig. III. is intended to show in schematic form the typical complete series of events in chronological order.

FIG. III.



Schematic representation of successive phases.

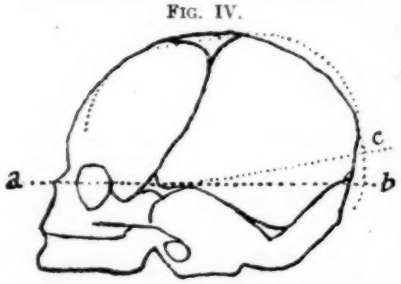
For an intelligent understanding of individual cases, which may come under notice for the first time at any one of these stages, the time-conditions must be clearly understood. Thus, the development of the postnatal area from inception at (2) to maximum at (5) occupies not more than ten weeks, the maximum falling within the fourth month of infancy. After this time the stage of re-ossification sets in and may occupy from two to ten months, according to the individual's power of tissue-repair and the degree to which the causes of his craniotabes continue to operate.

These time-conditions obviously bear on the effects to be inferred from treatment. To test the value of therapeutic measures cases should be chosen of ages 2 to 2½ months and be known, by a short preliminary study to be spreading. Inferences from cases at and after the fifth month could only be valid for large numbers, for in these with few exceptions natural repair is going on. It is, however, often possible to judge the probable rate of healing. Large areas of nearly uniform consistence and of first or second degree (not softer) are probably healing quickly. In the slower type healing takes place by irregular intrusions of bone. This is found, in my experience, in those of feebler physique. The curious condition called "worm-eaten" is thus caused, the plates of new bone dividing the original area into smaller ones, which gradually become fissure-like and tortuous. A "worm-eaten" area, therefore, is one that is healing, but healing slowly.

The quality, extent, and duration of a case are partly, of course, determined by the conditions of external pressure on the skull.

If an infant aged 4 months is of good activity and carried about much propped up on the arm, his areas will probably not go on to coalescence but begin to harden up. When he can sit up unaided and spends much of his time sitting up, his areas take on hardening. This should be clear, but it may be lost sight of. Thus the late George Carpenter[5] argued that craniotabes was not evidence of rickets, because at an age when the signs of rickets are increasing craniotabes is decreasing.

FIG. IV.



The occasional occipital is accounted for by the varying shape of the head. In most infant skulls a line *a b* (see Fig. IV.) drawn from outer angle of the orbit to upper border of the petrous will pass slightly below the level of the posterior fontanelle. Less commonly this fontanelle is higher placed, as at some point between *b* and *c*. The skull is then taller and the posterior part somewhat flattened inferiorly, bringing the sides of the squamous within the area of direct pressure. So far, the few cases in which I found the occipital alone affected have been in the older subjects, and I have reason for considering this a survival of a larger area which included the adjacent parietals.

Conclusions.

Needs of space preclude further detail. Enough to say that the series of continuous observations on which the foregoing description is based, though not large enough for exhaustive inferences, has been amply sufficient to establish a rule that when an infant is born with craniotabes he will continue to develop it anew in the situations described, and to show that the severities of primary and secondary areas are commonly in direct ratio.

On the other hand, parallel observations on slightly over 100 controls enable me to infer that infants (vertex presenting) born without craniotabes seldom show it postnatally. I have met with six exceptions among these. In all six the postnatal area was single, small, and of the first degree. One may hazard either that a small fœtal area had hardened by the time of birth, or, more rationally, that the combined causes of craniotabes were operating too feebly to produce it in utero. Conversely, it seems likely that a trivial fœtal area may occasionally not be followed by a postnatal area for a like reason. My data show, however, that if such a case be re-observed between the tenth and fourteenth week careful examination of the parietals is likely to disclose a definite new area on one side of rather feeble development and transient duration.

The present inquiry has been instrumental in showing that areas of softening observed at birth are clinically and, I doubt not, pathologically identical with craniotabes of the recognised type, the points of agreement being: (1) identity in the physical characteristics of the areas in both types; (2) association with, and dependence upon, external pressure on the areas affected in both types; (3) habitual occurrence of both types in the same individual. In addition to these salient proofs, other evidence might be brought in corroboration. I shall limit myself here to one example.

Of twins, one alone had softening of the fœtal type at birth, and at age 4 weeks began to develop the usual postnatal areas, which subsequently spread. The other twin also developed extensive postnatal craniotabes at the same period, and hardening was complete in both at the ninth month. The inference is that the existence of a fœtal area in one only depended on the accident of their position in utero, both being potentially craniotabetic, and that the fœtal softening in the one was pathologically identical with the subsequent craniotabes of both.

The Question of Causation.

Friedleben found, in infants during the second three months, an average diminution of about 3 per cent. in the calcium content of the posterior parts of the skull. This accords with the fact that the total duration of mechanical pressure on these parts has been greater at some stage of the second three months than before; and with the time-incidence of the maximum softening in craniotabes. But if the available pressure were sufficient of itself to produce atrophy to the point of recognisable craniotabes, there would be nothing to prevent nearly all infants from reaching that point, except such natural variations as exist in the initial thickness and density of the skull. These variations, however, could not explain the immense differences in the liability to craniotabes. There must therefore be an additional cause; and that this is pathological is shown by the affection being confined to a minority, who moreover are found to give evidence, sooner or later, of disease.

To account for this (organic) part of the causation, at least five hypotheses have been brought forward—i.e., that craniotabes is due to (1) rickets; (2) syphilis; (3) rickets combined with syphilis; (4) one or the other in different instances; (5) neither, but to some cause at present unrealised. Of these, the view numbered (4) is more easily disposed of than the others.

Concerning the forms of craniotabes under discussion, I have not, in over a decade of study of them, met with a case which departed so definitely from type as to fall outside the description already given. Upholders of the above view have the option of showing that this craniotabes consists of two distinct varieties wrongly classified under the same term, or else of falling into an error of theory very prevalent in medical reasoning by which it is carelessly assumed that the same event may have two or more different sets of causes.

The view numbered (5) rests on the undoubted fact that neither syphilis nor rickets can be demonstrated in every case; further, that both are sufficiently common among the town-bred to be regarded as adventitious accompaniments. These points are not easily met.

The absolute frequency of syphilis and rickets in the non-craniotabetic has never, to my knowledge, been worked out; nor have enough cases of craniotabes been followed up to show that they did or did not develop rickets or a syphilis previously latent. The absence of rickets is, one suspects, apt to be loosely affirmed, as it is a troublesome matter to follow up a considerable body of cases through the ages required for certainty on this point. Of 37 in which these conditions were observed I found obvious rickets in 35, in most of these moderately severe. There was also a significant ratio between the amount of craniotabes and the subsequent rickets. Of the two negatives, in one the areas of softening, primary and secondary, were trivial in extent and degree. In the other case the two previous children of that parentage had both been under my observation with rickets of some severity.

Regarding causation by syphilis: of the present 94, 40 were certainly syphilitic, 21 more were probables. In

[5] Carpenter: Brit. Jnl. Chil. Dis., March, 1908.

the remaining 33, evidence was either vague or absent.[6] Only 13 showed a severe infection. For this reason, clinical estimates of its proportion are apt to be fallacious unless examination is made in the early weeks, on repeated occasions, and knowledge is included of the parents or their previous children. On the hypothesis that syphilis is causal, however, these clinical deductions should prove correct:

1. In those severely tabetic, there should be evidence of syphilis, especially of cranial syphilis, co-existing or sequent. Of the present series, 38 had extensive softening, both sides being affected, with confluence of areas. Of these 6 showed severe syphilis, 13 mild forms, and in 19 syphilis was absent on all counts.

2. Where cranial syphilis co-exists, the greatest amount of craniotabes should coincide with the greatest activity of the syphilitic process in that instance.

3. On subsidence of the inflammatory condition of the bones, the craniotabes should be found to diminish *pari passu*. This should occur at least to a partial extent.

Craniotabes, however, in cranial syphilis I find to follow the pressure conditions, without relation with the syphilis. Among my records are cases where all signs of cranial and other syphilis were reduced under treatment; yet during or after their removal, craniotabes appeared. In a number of others, an existing postnatal area behaved during a course of mercury as though totally uninfluenced.

A boy, aged 9 weeks, with rather severe syphilis also involving the cranium, showed an area of second degree (postnatal). Vigorous treatment by inunctions was then carried out for four weeks, before the end of which all evidence of syphilis had disappeared, together with considerable gain in weight. The original area remained as before, and one of larger size had meanwhile developed on the opposite bone.

The curious view has been advanced by Marfan that syphilis can only be causal when co-existing with rickets. But this clearly breaks down unless syphilis can be proved present in nearly every case. It happens that a clinical diagnosis is far more weighty in infancy than in later years, as nearly all congenital cases give evidence within six months of birth. I can assert the absence of syphilis, therefore, without misgiving in certain whole families furnishing craniotabetics; and in a few it has been possible to maintain a scrutiny much closer than ordinary. The following is an instance:—

The first (male) child of young parents had an entirely uneventful infancy, and is now 8 years old. The next (female) had mild rickets, and is now 4 years. The third (male) had fœtal and extensive postnatal craniotabes, and is now, at 12 months, definitely rachitic. I have been in very close professional touch with this family for over eight years, during which time no trace of syphilis has appeared. The father, aged 29, shows no physical signs, and his venereal history is negative.

Such evidence as the foregoing, taken together, seems to rule out the causality of syphilis. The more rational view is, I think, as follows:—

Granting that the incidence of syphilis is much too high to be dismissed as adventitious, we may suppose it to favour the true cause in some manner now obscure. Assuming this cause to be rickets, syphilis will therefore favour the existence of rickets. Hochsinger has concluded that syphilis can hasten its onset; and this, if correct, would help to explain why pressure is likely to produce craniotabes in a syphilitic subject. But one is driven to grant that rickets not seldom exists during the period when the fœtal head comes to assume a more or less constant position in the lower uterine segment.

The following case may be cited as relevant to the present argument.

The first child (female) of apparently healthy young parents had fœtal, and at the second month postnatal, craniotabes, which underwent partial development. No syphilis, but well-marked rickets appeared in second year. During the first pregnancy the father joined the Army, and on a return on leave the mother conceived again. The next child (male), born 13½ months after the first, had fœtal followed by large postnatal areas, and at four weeks an extensive macular syphilide, rhinitis, slight hydrocephalus, &c. He responded well to treatment, though the craniotabes continued to spread, as in others. The fœtal area in the first child was moderate in size, involving the left parietal; in the second larger, involving both bones; and his postnatal areas were also larger.

This is offered as a possible illustration of syphilis in the rôle of accomplice. That the first child is a latent syphilitic is conceivable, but is not an impartial reading of the data.

In imagining a method by which syphilis might favour the cause, the added effect of plus intracranial tension seemed to merit inquiry. Gauging its degree by the fontanelles and amount of venous turgidity, I recorded 41 cases of cranial syphilis during the first four months, finding craniotabes in 9. In 16 the tension was relatively high, and 5 of these had craniotabes. Probably the effect of tension is negligible, as in many it cannot be shown to be increased.

While it is clear that mercury is without influence on craniotabes, the therapeutic test for rickets cannot easily be made on young infants, both through the dietetic limitations and the lack of a "specific" for this disease. Experiments, however, both dietetic and medicinal, had been begun on selected cases, which have had to be temporarily relinquished.

[6] Of 100 cases collected by Lees and Barlow (Trans. Path. Society, 1881) 47 were certainties, 40 more were probables.

THE NERVOUS SEQUELÆ OF CEREBRO-SPINAL FEVER.

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PRIOR to the introduction of repeated lumbar puncture and the intrathecal administration of specific anti-serum as routine measures in the treatment of cerebro-spinal fever many of the relatively few cases that recovered appear to have suffered from some permanent disability, either mental or physical.

The older writings on the subject abound with references to the frequency of infirmities met with in survivors from the disease. Some allowance, however, must be made for the fact that, owing to the absence of accurate diagnosis by an examination of the cerebro-spinal fluid obtained on lumbar puncture, polio-encephalitis and the so-called meningeal form of acute anterior poliomyelitis were often confused with meningitis; consequently many of the paralytic sequelæ of the former diseases were erroneously attributed to meningitis. Nevertheless, serious disabilities frequently followed cerebro-spinal fever, by reason, no doubt, of the compression to which the brain structures were subjected during the course of the disease by the increased tension of cerebro-spinal fluid unrelieved by lumbar puncture.

Contrary to popular supposition, it is an undoubted fact that in recent years serious sequelæ have been considerably less frequent than formerly. These improved results are not only due to the relief of intracranial pressure afforded by repeated lumbar puncture, but also to the shortening in length of the usual course of the disease occasioned by the use of antimeningococcal serum administered intrathecally.

In infants, as formerly, the sequelæ remain the most serious.

Batten, for instance, writing in 1915, states that in the endemic form affecting infants and occurring annually in London, only 15 per cent. of cases recover completely; 35 per cent. survive but exhibit some permanent defect—either mental impairment, hemiplegia, diplegia, or blindness, while the remaining 50 per cent. prove fatal. In infants internal hydrocephalus is a most frequent complication, its development and course being considerably modified by the anatomical condition of the infantile cranium; the intracranial pressure brought about by the accumulation of cerebro-spinal fluid in the ventricles not only leads to compression of the cerebral tissues, but also expends itself in producing bulging of the fontanelles and separation of the cranial sutures.

In the infant, therefore, the nervous structures of the cerebral cortex are subjected to a considerably more gradual pressure than is the case when, as in the adult, the cranial capacity is a fixed quantity. These facts may account for the occurrence in children of permanent disabilities such as diplegia, blindness of central origin, and mental impairment, which at the present time are observed in adults only with extreme rarity.

The following description of the conditions of nervous origin which may result from an attack of cerebro-spinal fever is based chiefly upon a study of a series of 120 recovered cases coming under the observation of the writer.

Mental Changes.

In the adult mental impairment is very rare. During 1915–17, of 120 patients recovered from cerebro-spinal fever, mainly adolescents and adults, I met with no instance in which permanent mental enfeeblement resulted. Bourke, Abraham, and Rowlands, however, state that of 77 military cases recovered from the disease (1915) feeblemindedness was present in two.

Among the minor psychical changes Netter mentions conditions of irritability and puerility, while other French authors describe marked loss of attention or memory, moroseness, morbid shyness and morbid egoism. During early convalescence I have observed that some patients may exhibit unevenness of temper, anger being easily evoked, while inability to concentrate the attention for any length of time is relatively frequent. Such changes rarely persist, but disappear after a variable period.

Puerility occurred in one case out of 120.

The patient, aged 23, had survived a severe attack of the disease; duration approximately 40 days. When first beginning to walk about he would attempt to carry out practically anything he was told to perform, no matter how absurd it might appear—e.g., walking on his hands and knees, lying under bed, &c. After a week or two, however, he recovered his normal mental equilibrium.

Three patients of the 120 recovered cases complained of defects of memory.

The first, seen three months after discharge from hospital, stated that he had occasional difficulty in remembering things that were told to him or orders it was his duty to carry out.

A second patient, four weeks after termination of course of illness, complained that he had forgotten the names of several of his intimate friends and also of places he had visited. When seen a year later his memory had greatly improved, but he considered that he could not remember facts as well as prior to his illness.

The third patient was employed in clerical duty at a military depôt; on returning to work he found that he had great difficulty in adding up columns of figures that previously he had managed with ease; no other psychical symptoms were complained of. Six months later his defect was still present.

Foster and Gaskell mention one recovered case in which there was complete loss of memory. As a concomitant paralysis of the right arm was present, however, the amnesia possibly owed its origin to a definite and localised cortical lesion. Six months later this patient's memory was almost completely restored, although some weakness of the arm persisted.

As regards permanent mental defects following the disease in infants, Looft estimated that 3·7 per cent. of 539 idiots owed their condition to an attack of meningitis. Netter, without doubt rightly, attributes a considerable number of such cases to insufficient serotherapy. Cases in which dementia results are often suffering from chronic hydrocephalus, which in some instances may persist for a considerable period. In all cases with dementia care should be taken to exclude hydrocephalus, even though apparent recovery from meningitis has occurred, before the patient leaves hospital.

Sensory Symptoms.

Headache.—Patients may continue to complain of headache for some time after convalescence is established and Kernig's sign is definitely absent.

In the majority of cases the headache entirely disappears after a few months; in others, however, it persists for longer. Of the 120 recovered cases already mentioned only 8 continued to suffer from headache three months after becoming convalescent; a few stated that the symptom only occurred after exertion, and in one case it was merely nocturnal.

Persistent headache of a severe nature may be due to a certain degree of hydrocephalus, which later may give rise to serious symptoms and even produce a fatal result.

Pain in the back.—Pain, weakness, and stiffness in the back are almost invariable complaints during the early stages of convalescence; in consequence, an awkward gait may persist for some weeks.

The majority of patients cease to experience backache about 3-4 months after termination of course of illness. Several, however, may complain of weakness in the back for many months after recovery; in some the symptom is only noticed on stooping, while in others pain is present in damp weather. Hyperæsthesia of the spine may occasionally persist well into convalescence.

That the pain and weakness in the back are due to the effect of the disease itself rather than to that of lumbar puncture is shown by an observation by Foster and Gaskell. A certain case in which lumbar puncture was performed once only, owing to the presence of auricular fibrillation, recovered completely from meningitis after a course of about 40 days; the patient, however, exhibited the symptom of pain in the back to a greater degree than other cases on whom a dozen or more punctures had been performed.

Also, I have known cases recovering from an abortive attack of the disease who had had no more than one or two punctures complain of pain and weakness in the back for a longer period than patients who had passed through a severe illness, necessitating the performance of many lumbar punctures. In all recovered cases I have carried out an examination for possible lesions of the cauda equina resulting from the punctures; of upwards of 120 cases, however, in no single instance could the slightest lesion be demonstrated.

Pain in the limbs.—Pain in the legs, persisting for more than three months after recovery, is a comparatively rare sequel. Occasional pain was complained of in two only of the 120 cases, the leading question not being put. Only one patient volunteered the information that he experienced occasional pain in the arms.

Motor Defects.

Ocular muscles.—As lesions of the nerves supplying the muscles of the eyeball usually improve coincidently with recovery from meningitis, permanent strabismus as a sequel is most uncommon. When present it is usually the result of involvement of the sixth cranial nerve.

Of the 120 cases only 2 exhibited an ocular palsy persisting for longer than three months after recovery from the disease.

The first patient, who during the attack of cerebro-spinal fever had had complete paralysis of both external rectus muscles, exhibited when seen three months after his discharge from hospital, complete paralysis of the left external rectus, while some weakness still remained in that on the right.

The second patient, examined six months after recovery, showed some nystagmus and marked weakness of one external rectus muscle.

Bourke, Abraham, and Rowlands, of 77 cases recovering, met two with permanent strabismus.

As a rule, the pupils remain somewhat dilated for some weeks after establishment of convalescence, but eventually become normal. Persistent myosis or inequality in the size of the two pupils is extremely rare. Permanent nystagmus also is most infrequent.

Limb palsies.—Paralysis of limbs, developing during the course of the disease, may persist for several months after recovery from meningitis. Monoplegias due to the involvement of spinal nerve roots almost always disappear eventually, although a considerable time may elapse before function is fully restored. As an example the following case may be mentioned:—

A child aged 6 years, suffering from cerebro-spinal fever, exhibited on the sixth day of illness considerable weakness of both arms. Three days later patient was unable to abduct either arm at the shoulder, the deltoid muscles being paralysed and flabby; paralysis of right biceps and triceps was also present, no degree of active flexion or extension being possible at the elbow. The supinator, biceps, and triceps jerks were unobtainable in both limbs, and hyperæsthesia was particularly marked in the right. By the fourteenth day there was a fair amount of wasting of affected muscles in right arm. Meningococci were present in cerebro-spinal fluid until ninth day of disease, and recovery from meningitis, as shown by the evacuation of a clear and sterile cerebro-spinal fluid, was not complete until the thirtieth day.

Fourteen days after recovery movement in the left arm had returned, but the right still showed paresis of the deltoid, biceps, and triceps. No response to faradism was obtained in these muscles, and with galvanism A.C.C. was greater than K.C.C. in the deltoid; in the biceps and triceps A.C.C. was about equal to K.C.C.

Full power was recovered in the affected arm about seven months after recovery from meningitis.

If a monoplegia or paralysis of a group of muscles persists without improvement, it is probably dependent upon definite changes in the anterior cornual cells.

Hemiplegia, occurring as a complication of cerebro-spinal fever, usually terminates in almost, if not quite, complete recovery.

For instance: In one case of the series, a boy aged 15 who ran a recrudescent course of over 80 days, hemiplegia developed about the fifty-first day of illness. By the termination of the course of meningitis (eightieth day), and about 30 days after appearance of hemiplegia, the paralysis of the arm had quite disappeared. Seven and a half months later, all that remained of the lower limb palsy was weakness of calf muscles and inability to flex or extend great toe; the other toes exhibited weak movement. Both patellar clonus and ankle clonus, previously present, had disappeared, but on the affected side, the knee-jerk and tendo Achillis jerk remained brisker than those in the opposite limb, and the plantar reflex was still extensor.

Cerebral hæmorrhage, occurring during the course of cerebro-spinal fever in middle-aged patients with pre-existing nephritis, may lead, if the patient recovers, to permanent hemiplegia.

Flaccid paraplegia, fortunately a very rare complication, may show some improvement but is usually permanent.

Some degree of weakness in the legs and unsteadiness of gait is frequent during the early stages of convalescence.

In a few instances, according to Sophian, exaggerated knee-jerks associated with a true ankle clonus and extensor plantar reflexes, may be elicited. I have frequently observed ataxia with a positive Romberg's sign and difficulty in walking; in many cases, exaggeration of the deep reflexes is also present. In no instance, however, in the absence of a definite upper neurone lesion has one found ataxia associated with either definite ankle clonus or a true extensor plantar reflex. Romberg's sign was not observed in any case in which a period of one month had elapsed from the time of the patient's beginning to walk.

One man, aged 30, was met with, who had had an attack of cerebro-spinal fever at Belfast eight years previously; for a considerable period following his recovery he had complained of weakness affecting the legs. When examined he stated that he still felt weak and "shaky" in the legs after violent exertion; he exhibited, however, no abnormal physical signs.

Peripheral neuritis.—This condition is a very rare complication of cerebro-spinal fever.

Of two cases seen in which definite neuritis affected the lower extremities, complete reaction of degeneration in the muscles supplied by the affected nerves developed in neither case. In one case the tendon reflexes were beginning to return, and sensation was nearly normal within three months of recovery from meningitis; the second patient, after a similar period, exhibited normal cutaneous sensation, but both the knee and ankle-jerks were still absent, and the vibration sense remained much diminished.

Muscular rigidity.—Rigidity of the cervical muscles persisting for any considerable period after recovery is extremely rare.

As a rule, neck rigidity is absent before or within a week or so of the cerebro-spinal fluid returning to normal. In the following case, however, actual head retraction persisted long after the course of meningitis, and even when the patient was up and about.

A youth, aged 19, was admitted to hospital acutely ill on the second day of a recrudescent attack of cerebro-spinal fever; four days earlier he had had an abortive attack elsewhere. On admission considerable head retraction was present. This symptom was still as marked on the twenty-fourth day of illness, by which time the cerebro-spinal fluid obtained on lumbar puncture was quite clear, sterile, and contained no more than the normal number of cells. At times occipital retraction had been so extreme as to cause difficulty in swallowing.

One month after the termination of the course, the patient having been up and about for over a week, there was still a tendency to head retraction, with inability to bring the head quite into the vertical position. Massage, &c., was then instituted and four weeks later there was some improvement; he remained, however, unable to flex the head beyond the perpendicular while standing in the erect position. Finally, it was not until three and a half further months had elapsed (five and a half months from termination of course of meningitis) that the patient was able to flex the head sufficiently for the chin to reach the chest.

Kernig's sign, in the majority of cases, persists for the first 5-14 days of convalescence.

In a few cases the sign may still be present for 20 or even 30 days following the evacuation of normal cerebro-spinal fluid and in the absence of all symptoms of hydrocephalus. Some rigidity of the hamstring muscles can occasionally be demonstrated 2-3 months after recovery.

Other Nervous Conditions.

Aphasia.—Persistent aphasia has been noted in rare instances. The only case of our series in which this complication occurred had fully recovered the faculty of speech before the termination of the course of the disease.

Epilepsy.—Sainton mentions epilepsy as a rare but occasional sequel of recovery from cerebro-spinal fever.

This observer mentions one case in which the crisis began with an aura of gastric origin—nausea and vomiting, followed by loss of consciousness and epileptic convulsions. The cerebro-spinal fluid between the crises was normal, but the fluid obtained immediately after the seizure showed a slight lymphocytosis. The general condition of the patient was good. Voisan reports a somewhat similar case.

Petit mal is also stated occasionally to occur.

Neurasthenia.—Considering the severity of the usual course of the disease process in cerebro-spinal fever, I have found the occurrence of true neurasthenia following recovery from the disease surprisingly uncommon.

It is contended by Dejerine and others that to constitute true neurasthenia, in addition to a state of neural fatigue, there must exist a condition of continued emotivity; the non-adaptation of a continuous emotive cause, to which is often added an obsessing preoccupation, produces a condition of neural exhaustion, and the sum-total of the phenomena resulting justifies a diagnosis of true neurasthenia.

The appearance of neurasthenia following recovery from cerebro-spinal fever, therefore, would depend to a large extent upon the temperament and inherent or acquired tendency to emotivity of the individual, as well as upon the severity of the disease. Chronic cases, it may be remarked, are more liable to become neurasthenic than those exhibiting a shorter course. Six patients only of the 120 cases recovered could definitely be said to show signs of true neurasthenia when examined 4–6 months after recovery from meningitis; of these six patients, two at least were neurasthenic prior to the attack of cerebro-spinal fever. Of the remainder the following case serves as an example.

The patient was examined six months after recovery from a severe attack of cerebro-spinal fever lasting approximately five weeks. He complained of frequent headache, soreness in the limbs, and of fatigue upon the slightest exertion; his appetite was poor and he slept badly.

Physical signs: The patient was thin and perspired freely during the examination although it was winter. The pupils were somewhat dilated, equal, and reacted sluggishly to light and accommodation. There was a well-marked tremor of the outstretched hands; the superficial reflexes were brisk and the knee- and ankle-jerks exaggerated. No ankle clonus was elicited and both plantar reflexes were flexor.

Two other patients exhibited a somewhat similar condition; one, in addition, complained of occasional loss of memory. Another recovered case, seen four months after his discharge from hospital, complained of sleeplessness but showed no other evidence of neurasthenia.

A slight tremor of the outstretched hands is frequently observed during the first few months following recovery from the disease.

One patient examined five months after recovery from meningitis closely simulated a case of disseminated sclerosis.

The man, aged 26, complained of occasional inability to use the left hand and also of frequent diplopia. On examination there was distinct rotatory nystagmus on lateral deviation of the eyes, together with weakness of the left external rectus muscle. The pupils were somewhat dilated but reacted normally to light and accommodation; the optic discs showed nothing abnormal. There was a coarse tremor of the outstretched hands, more marked on intention, together with some incoordination of the left arm. The left hand-grip was considerably weaker than that on the right; the left supinator, biceps and triceps jerks were brisker and of greater range than those on the opposite side. Both the knee and tendo Achillis jerks were brisk and exaggerated but equal on the two sides; ankle clonus, however, was absent and both plantar reflexes were definitely flexor. The abdominal and epigastric reflexes were also well marked and speech was normal.

The presence of the abdominal reflexes and a bilateral flexor plantar response alone serve to distinguish the above condition from disseminated sclerosis.

Foster and Gaskell mention a recovered case exhibiting exaggerated knee-jerks, volitional tremors, weakness of the bladder, and pallor of the optic discs.

Special Senses.

The eye.—Blindness may result from (1) damage to the tructures of the eyeball; (2) permanent changes in the nervous tissues associated with vision.

1. *Damage to structures of eyeball.*—Corneal ulceration may leave permanent opacities, and loss of vision is the usual sequel to iridocyclitis. This latter complication had occurred in one case of the 120; when examined three months after recovery from meningitis he was able only to distinguish light from darkness with the affected eye. Panophthalmitis is almost invariably followed by complete blindness in the affected eye.

A large vitreous hæmorrhage, associated with optic neuritis, occurred in one of our cases during the course of illness. When seen three months after recovery, the vitreous was practically clear and vision in the affected eye was 6/9.

2. *Permanent changes in the nervous structures.*—In adults, blindness of central origin is very rare; when present, it is usually due to optic atrophy and is permanent and incurable.

In infants suffering from the posterior basic type of the disease, blindness, according to Langmead, develops in about 30 per cent. of cases. Although at first the optic discs may exhibit no definite change, optic atrophy usually develops at a later stage. In most instances the blindness is due to changes in the visual centres situated in the cerebral cortex of the occipital region.

No instance of blindness of nervous origin occurred in the series of cases under review.

The ear.—Deafness is the most common of the serious sequelæ met with at the present day.

The disability is almost always bilateral and if persisting during convalescence, is usually permanent; some recovery, however, has been known to occur in a few instances after an interval of two or three months.

Below the age of 7 or 8 years permanent deafness usually leads to an associated mutism; even though speech has begun it gradually disappears. Statistics of the proportion of acquired deaf-mutes who owe their defect to cerebro-spinal meningitis are widely divergent, the number as estimated by different observers varying from 8 to 45 per cent. The condition appears less common in the posterior basic type of the disease than in the more ordinary types. There is little doubt, however, that permanent deafness resulting from cerebro-spinal fever is much less frequent now than formerly. The condition is probably brought about by atrophy of the auditory nerve and possibly some destruction of the cochlea.

Permanent and absolute deafness was present in 2 cases only of the 120 recovered from cerebro-spinal fever. Partial deafness (20 per cent.) of central origin resulted in one other case.

Vaso-motor and Secretory Disturbances.

In the majority of cases a well-marked tache cérébrale can usually be elicited for many weeks, or even months, following the disease.

Profuse and easily elicited perspiration, apart from a condition of neurasthenia, was present in some cases of the series up till two or three months after recovery from meningitis.

The Reflexes in Recovered Cases.

The following observations are the result of a study of 120 cases recovered from the disease and seen at various periods from two months to one year after recovery. One case of hemiplegia is excluded.

Knee-jerks.—In five cases only were the knee-jerks found absent, in spite of the employment of the usual methods of reinforcement.

Of these five cases, in two patients their absence was dependent upon the presence of definite peripheral neuritis, the tendo Achillis jerks also being absent, together with loss of both epicritic and protopathic sensibility over certain areas of the lower limbs. In two other cases the tendo Achillis jerks also were not elicited, although there was no definite evidence of neuritis. The last case exhibited absent patellar reflexes, but the tendo Achillis jerks were brisk.

In 10 cases the response to tapping the ligamentum patellæ was very slight.

In 30 cases the knee-jerks were distinctly brisk and exaggerated, but in no instance was this condition associated with either true ankle clonus or a definite extensor plantar reflex.

In the remaining 75 cases the knee-jerks could be described as moderate.

Marked inequality in the reflexes of the two sides was noted in three instances only, and was unassociated with any other physical signs.

Tendo Achillis jerks.—This tendon reflex is usually proportional to that obtained at the knee.

In one case only, mentioned above, were the tendo Achillis jerks elicited in the absence of the patellar reflexes. In two instances the tendo Achillis jerks were brisk, but the knee-jerks excessively slight.

Inequality of the ankle-jerks on the respective sides was observed in two cases, one of which also exhibited a corresponding inequality in the knee-jerks.

In no instance was true ankle clonus obtained. Three cases showed what might be described as unilateral pseudo-ankle clonus, unassociated with any signs of an upper neurone lesion.

Plantar reflexes.—In all cases plantar stimulation yielded a flexor response.

Abdominal reflexes.—It would appear that cerebro-spinal fever may occasionally lead to permanent loss of the abdominal reflexes.

Failure to elicit these reflexes occurred in three cases; of these, no patient exhibited any other abnormal physical signs and in each they had been obtained in the earlier stages of the attack of cerebro-spinal fever.

In 14 cases the abdominal reflexes were only very slight, while in eight they were more than usually brisk. In all the remaining cases these superficial reflexes were moderate. Inequality was noticed in two cases only.

Summary.

A summary of the more serious sequelæ occurring in the series of 120 cases is as follows:—

Strabismus	2 cases.	Hemiplegia	1† case.
Blindness (peripheral) (one eye)	1 case.	Neurasthenia (true) ...	4 cases.
Monoplegia	1* ,,	Deafness (absolute)	2 ,,
		,, (partial)	1 case.

* Function fully restored about 7 months after recovery from meningitis.

† Recovery nearly complete as regards motor power 7½ months after onset.

From this table it will be seen that including neurasthenia 10 patients only of the 120 (8·3 per cent.) suffered from more or less permanent sequelæ.

Of the military cases recovering from the disease—94 in number—as far as I am aware it was necessary sooner or later to discharge as medically unfit for further Army service in any category whatever 11 cases only (11·7 per cent.).

Of these, one patient was neurasthenic prior to developing cerebro-spinal fever, and in addition had double otitis media of old standing; in the ordinary course of events he would have been discharged quite apart from the attack of cerebro-spinal fever. In four further cases discharge was also recommended on account of neurasthenia.

The presence of permanent deafness accounts for two others.

One patient each was invalided on account of one of the following disabilities: persistent strabismus, blindness (peripheral) of one eye, residual weakness of the foot remaining after hemiplegia, and lastly, in a patient aged 41, persistent pain in the lumbar region on exertion.

A NEW METHOD OF PREPARING GONOCOCCUS ANTIGEN,

AND A NEW TECHNIQUE FOR THE COMPLEMENT DEVIATION TEST.

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Introduction.

The complement deviation test in gonorrhœa is destined to be of great importance. It is well known that it is extremely difficult to determine, by clinical and microscopic methods, when a person is definitely cured of this disease. This is especially true in the case of women, and it is a great responsibility for a physician to state that a given case is free from infection. The test will come to be of great value in this respect. It will prove a great source of help to the gynæcologist and will aid considerably in the differential diagnosis of many obscure cases of joint disease.

Researches which Led to Discovery of the New Method of Preparing the Gonococcus Antigen.

The gonococcus is a germ which autolyses or breaks up very readily. For this reason a vaccine of the organism does not keep well, but rapidly disintegrates and eventually becomes an autolysate. An investigation was carried out with a view to finding the cause of this autolysis, so that a more stable vaccine might be prepared. It was eventually ascertained that weak acids prevented autolysis, but that weak alkalies increased it. In consequence the vaccine is now made up in a weak acid solution by using 0·6 per cent. acid sodium phosphate instead of ordinary saline. In the course of this research it was found that the gonococcus was extremely soluble in alkali, so much so that if a profuse growth of the germ is shaken up with beads in an N/10 or N/20 solution of sodium hydrate, a clear solution is formed almost instantaneously. If sufficient acid be added to this alkaline solution to render it acid, a white precipitate is immediately formed, which is probably a precipitate of fatty acids. So it would appear that the gonococcus consists largely of a fatty substance, which is immediately saponified by the addition of an alkali. The meningococcus is similarly soluble in alkali, but apparently not quite so soluble as the gonococcus, and a faint milky tint is left in the solution. A strain of *Micrococcus catarrhalis*, on the other hand, was not soluble in alkali, so that a permanent opaque white emulsion remained after shaking up a growth of this organism in N/20 sodium hydrate. It would appear that this might be a useful method of distinguishing between these three allied species of organisms.

Method of Preparing the Gonococcus Antigen.

About this time Lieutenant-Colonel Harrison asked me to try to work up the complement deviation test for gonorrhœa. He had used the ordinary gonococcus vaccine as antigen with successful results in 1914. In consequence I employed at first our stock vaccine and found that it gave successful results when used in a strength of about 100 millions per c.cm. More concentrated vaccines were too anticomplementary for use. It then occurred to me that an antigen prepared by dissolving the gonococci in alkali and then rendered neutral might be suitable, and indeed it proved to be superior to the vaccine itself, being less anticomplementary and at the same time more powerful as an antigen in the blood test.

I make up this dissolved antigen in the following manner:—

(1) Prepare a standard emulsion of gonococci, such that 1 c.cm. contains 1000 millions per c.cm., and place this in a sealed test-tube about 1 inch in diameter.

(2) Shake up a profuse growth of gonococci (24 hours' incubation) in a test-tube containing beads and about 6 c.cm. of saline.

(3) Add one-half of this concentrated emulsion to a test-tube (A) of the same diameter as that which contains the standard and add the other half to a similar test-tube (B).

(4) Dilute the emulsion in tube (A) until it exactly matches the standard containing 1000 millions per c.cm.

(5) To the other tube (B) add a few c.cm. of N/10 sodium hydrate to dissolve the gonococci; a clear alkaline solution will be immediately obtained. Now add N/10 hydrochloric gradually until it is just neutral or very faintly alkaline to litmus. We now have a nearly neutral solution of gonococci. Add to this 0·85 per cent. saline containing 0·5 per cent. carbolic acid until the volume is exactly the same as that in tube (A), prepared as in (4) to match the standard. This gives us a solution containing 1000 millions of dissolved gonococci per c.cm. This should be stored in the ice chest as the stock antigen. It appears to keep well, and it does not become septic because of the weak carbolic it contains.

(6) For use this antigen should be diluted 10 times with 0·85 per cent. saline so as to bring it to a strength corresponding to 100 millions per c.cm. When used in the blood test it will be found that this antigen will absorb, as a rule, much less than one minimum hæmolytic dose of complement.

Antigens of many strains of gonococci have been prepared as above and are now being used in this research. So far I have tested the sera of 30 cases with 12 separate antigens, as well as with a mixed antigen composed of all the 12 strains together. This has shown clearly that a compound antigen is better than the antigen prepared from a single strain. A single antigen may only give a very weakly positive test with a given serum, while the single antigen of a different strain will give a strongly positive test; a compound antigen, however, gives a good positive where a single antigen may only give a very indefinite positive. It was also considered advisable to use a meningococcus antigen simultaneously with the gonococcus strains in my experiments, and a culture of this organism was kindly given by Major T. Hine, R.A.M.C. So far my experiments have shown that the meningococcus antigen almost invariably gives a weakly positive result with a strongly positive gonococcal serum; but a weakly positive serum gives a negative result with the meningococcus antigen. This shows that the meningococcus is a very closely allied organism.

Parke, Davis and Co.'s compound gonococcus antigen was tested against a compound gonococcus antigen prepared by the new method described above. The latter proved to be superior in two respects. It was less anticomplementary and more powerful antigenically, and sera which gave a weak positive with Parke, Davis and Co.'s antigen gave a strong positive with that prepared by the new method. It would appear therefore that a definite advance in the preparation of the antigen has been achieved.

The New Technique Employed in Carrying Out the Blood Test.

For this new and highly satisfactory technique I am indebted to Lieutenant-Colonel Harrison. He advised me at the commencement of my experiments to use a well-diluted serum and to allow for thorough fixation of the complement by placing the tubes in the ice-chest overnight previous to the addition of the sensitised cells, according to the method devised by Dr. Griffith, of the Local Government Board Bacteriological Laboratory, as a result of his researches on the Wassermann test (unpublished).

(1) *Inactivation of the serum.*—The serum to be tested is inactivated by heating to 55° C. for ten minutes in a water bath before dilution.

(2) *Standardisation of the complement.*—The complement should be titrated against the stock antigen diluted 1 in 10 with 0·85 per cent. saline as used in the test. To 12 Wassermann tubes add 0·1 c.cm. of guinea-pig serum (complement) diluted as follows:—

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$\frac{1}{10}$	$\frac{1}{20}$	$\frac{1}{30}$	$\frac{1}{40}$	$\frac{1}{50}$	$\frac{1}{60}$	$\frac{1}{70}$	$\frac{1}{80}$	$\frac{1}{90}$	$\frac{1}{100}$	$\frac{1}{110}$	$\frac{1}{120}$

To each add 0·1 c.cm. of the diluted antigen (1 in 10) and 0·1 c.cm. of saline. Shake the tubes and place the tray in the ice-chest for one hour. Then put tray in water bath at 37° C. for half an hour. Add to each tube 0·1 c.cm. of fully sensitised sheep's corpuscles (3 per cent. suspension). Replace tray in water bath at 37° C. and take the readings after 15 minutes. The highest dilution of complement which produces complete hæmolysis should be taken as one minimum hæmolytic dose.

(3) *The Test.*—Three tubes, A, B, and C, are employed.

(*a*) To A and B add 0·1 c.cm. (at a dilution of 1 in 20) of the inactivated serum to be tested. To C add 0·1 c.cm. of normal saline.

(*b*) To A add complement 0·1 c.cm. containing 3 min.* hæmolytic doses.
" B " " " " 2 " " "
" C " " " " 2 " " "

* Minimum.

(*c*) To A, B, and C add 0·1 c.cm. compound antigen (diluted 1 in 10). Tube C acts as the control.

(*d*) Place the tubes in the ice-chest overnight and next morning add to each 0·1 c.cm. of a 3 per cent. emulsion of fully sensitised corpuscles. Then place the tubes in the water bath at 37° C. and take the reading after 15 minutes. The control tube C should show complete hæmolysis.

Hæmolysis in A and B indicates a negative reaction. No hæmolysis in A and B indicates a strong positive. No hæmolysis in B alone indicates a weak positive.

N.B.—An antigen control is preferable to a serum control, since the antigen absorbs a considerable amount of complement during the long period of fixation in the ice-chest. It is not practicable to use the long fixation method in the process of standardising the complement, since the complement deteriorates from day to day. As a rule, it is hardly necessary to use a serum control, since the serum is diluted 1 in 20. With a serum, however, which has stood for several days and may be septic an additional serum control would be advisable.

The results obtained have been exceedingly gratifying, and this is due, no doubt, to the superiority of the antigen as well as to the superiority of the long method of complement fixation in the ice-chest. The sera of patients whose gonorrhœal discharge only commenced one week previously have all given a positive test—some weak, some strong.

The test also indicates the presence of the disease long after the disappearance of the gonococci, according to the microscopic and cultural tests. A case which had had no discharge for a month gave a strong positive test, and he relapsed shortly afterwards.

In a series of 20 cases in the hospital 19 gave positive tests and one was negative. The negative case had shown no gonococci microscopically during the previous three months, and was evidently free from the disease. All normal sera so far have given negative results.

I wish to thank Dr. A. Allport for his assistance in supplying me with cases and the histories thereof from his clinic at the hospital. I am especially indebted to Lieutenant-Colonel Harrison for giving me the full credit of this work, since the success obtained has been so largely due to technique which he advised.

References.—Harrison, L. W. (1914): "Complement Deviation in the Diagnosis of Gonococcal Infections," Jour. Roy. Army Med. Corps, February, vol. xxii., No. 2. Thomson, D. (1918): "Researches on the Cause of Autolysis in the Gonococcus, with Special Reference to the Preparation of Gonococcal Vaccine," Journ. Path. and Bact. (in the press).

A QUICK METHOD OF DIAGNOSING THE TYPE OF MENINGOCOCCUS IN CASES OF CEREBRO-SPINAL FEVER.

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IN the effective treatment of cerebro-spinal fever early recognition of the type of the infecting meningococcus is of the utmost importance in order that the corresponding specific curative serum may be given as soon as possible.

Under the most favourable circumstances 48 hours must elapse before the meningococcus can be grown from the cerebro-spinal fluid or naso-pharynx of the case and its correct type diagnosed by agglutination, and not infrequently 72 hours pass before the infecting meningococcus is classed.

An attempt was made in the first place to shorten this period by substituting a precipitin for the agglutination reaction; it failed dismally. Finding that in case of the four univalent agglutinating sera prepared from the rabbit and sent out from the Central Laboratory for identifying types of the meningococcus the results given by complement-fixation were practically identical with those obtained by agglutination, the writers next proceeded to apply the complement-fixation test to serum taken from patients at an early stage of cerebro-spinal fever, using the four-standard type cocci as antigens in each instance. The results obtained in 16 successive cases of cerebro-spinal fever were as shown in the table given below.

It will be seen that in each of the 16 cases except (*b*) the results were not clean-cut. Nevertheless, the indication obtained by this method was proved right in all of the cases in which the type of the coccus could subsequently be verified by agglutination of the culture isolated from the cerebro-spinal fluid or naso-pharynx of the patient. Contrary to the experience of some other workers, it was found with one exception that there were too few antibodies in the patient's sera to produce agglutination with the four type emulsions.

Serum Control, 1 : 50, negative in each case.

No. of case.	Day of disease.	Dilutions of serum.												Type of coccus isolated from C.S. fluid or naso-pharynx.
		Type I.			Type II.			Type III.			Type IV.			
		1 : 50	1 : 100	1 : 200	1 : 50	1 : 100	1 : 200	1 : 50	1 : 100	1 : 200	1 : 50	1 : 100	1 : 200	
a.	50	††	–		†††	†††		†	†		†	–		II.
b.	14	–	–		–	–		†††	†		–	–		III.
c.	5	†††	†††	††	–	–	–	†††	†††	(†)	–	–	–	I.
d.	27?	†††	††	†	††	††	(†)	††	††	(†)	††	††		I.
	41?	†††	†	†	††	†	–	††	††	†	†	–	–	
e.	5	†	–	–	†††	†	–	†††	††	–	††	–	–	III.
	9	††	†	†	†††	††	†	†††	†††	†††	††	†	†	
f.	30	†	–		††	†		(†)	–		(†)	–		II.
g.	35		†	–		††	–		††	–		††	(†)	II.
h.	3	(†)	(†)	–	†	†	–	–	–	–	†	(†)	–	
	5	†	(†)	(†)	†††	††	(†)	†	†	–	††	†	(†)	
	28	(†)	–	–	††	†	–	††	–	–	–	–	–	
i.	4?	†	–	–	††	††	–	†	–	–	††	†	–	
j.	4?	††	†	†	†††	††	††	††	†	†	†††	††	††	IV.
k.			††	†		†	–		†	–		(†)	–	
l.	6	†††	†††	†††	†	†	–	†††	†††	†	†	–	–	I.
m.	7	†††	†	†	††	(†)	–	††	(†)	–	††	(†)	–	I.
n.	10	†††	†††	†††	†	(†)	–	†††	†††	†††	††	†	–	I.
o.	4	††	(†)	–	†††	†	–	††	(†)	–	††	†	–	II.
p.	5	†††	†††	††	†††	†	–	†††	†	–	†††	††	–	I.

†††, Complete complement fixation (absence of hæmolysis).
–, Negative fixation (hæmolysis complete).

Controls of normal serum from several sources were carried out in each instance and gave uniformly negative results. Serum from four syphilitic and eight gonococcal cases also gave either negative results or very slight complement fixation, and then only at a dilution of serum of 1 : 50. A sample of serum from a case (1) which subsequently was regarded to be one of tuberculous meningitis gave a positive result. The explanation of this is not yet clear. The earliest day on which a positive result was obtained was the third, but the history may have been incorrect, and this point wants verifying. The case indicated as "h" in the table shows the difference in antibody content of three specimens of blood collected on the third, fifth, and twenty-eighth days of the disease respectively.

Technique.—Two different antigens have been made use of so far. At first suspensions of the stock cocci were used in a strength of 200 million organisms per c.cm., this strength being chosen because an emulsion of 400 million per c.cm. was found to be slightly anticomplementary. Later, at the suggestion of Captain Thomson, of the Military Hospital, Rochester Row, who has been studying the test in relation to gonococcus infection, an antigen was made by dissolving the cocci in N/20 NaOH and bringing the solution back almost to the neutral point by the addition of N/20 HCl. This antigen is used in a dilution equivalent to 100 million cocci per c.cm. It is found to be a much more sensitive antigen than the stock suspension, though less specific with a serum rich in antibodies.

The patient's serum is tested in dilutions of 1 : 50, 1 : 100, and 1 : 200. It is found to be advisable to use all three dilutions for each test, as the readings are not sufficiently clean-cut for a single dilution only to be used. A sheep hæmolytic system is used and complement is obtained from the ear of a guinea-pig.

In the titration of the complement the following method is followed :—

Increasing doses of a 1 : 10 solution of complement—viz., 0·15 c.cm., 0·2 c.cm., 0·25 c.cm., &c.—are added to tubes already containing antigen and 1 : 50 normal human serum in the proportions subsequently used in the actual test. These are incubated in the 37° C. water-bath for half an hour before the hæmolytic couple is added. The exact amount of complement required to bring about complete hæmolysis under these conditions is then used in the test proper. A control is put up of the serum of the patient without the antigen and a further control of the antigens only.

THE Johannesburg Municipal Council has appointed Dr. A. J. Milne acting medical officer of health, during the absence of Dr. C. Porter, at a salary at the rate of £2000 per annum.

A NOTE ON

THE LOSS OF COMPLEMENTING POWER IN KEPT SERUM.

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THE laws governing the disappearance of complement from sera are of the utmost importance in the elucidation of the problem of complement-fixation in the various "lytic" and other phenomena. Owing to the difficulties in the determination of even the simplest instance of the loss of complementing power—i.e., in kept normal serum—the literature only contains vague and contradictory statements, such as:—

Complement "disappeared spontaneously if the serum was kept for a few days" (Emery [1]); "Alexines are of the most unstable nature" (Ehrlich and Morgenroth [2]); "Rapidly, often within 24 hours, loses its strength when kept at room temperature" (Muir and Ritchie [3]); at 10° C. serum possesses only half its original strength at the end of 24 hours (Noguchi and Bronfenbrenner [4]); whilst Massol and Grysez,[5] without indicating their methods of investigation, give some determinations showing that the complementing powers of sera decrease rapidly at the commencement, becoming inactive by about the sixteenth day.

We have therefore endeavoured to determine the rate of loss of complementing power in kept normal serum in order to ascertain whether it is a regular phenomenon obeying definite physico-chemical laws. To this end we have elaborated a technique whereby the hæmolytic complement content of a kept serum can be ascertained with some exactitude from day to day.

The chief difficulty in such an investigation is in the preparation of standard suspensions of red corpuscles, which can be kept for the purpose of the determinations. This we have overcome by using sheep cells washed and stored in the manner described by Rous and Turner,[6] since we find that the susceptibility of such cells to hæmolysin, although somewhat increased during the first 48 hours, subsequently appears to remain nearly constant for a greater length of time than that covered by our experiments. We therefore allowed at least 48 hours to elapse before using the cells, and in this way obtained a preparation suitable for the investigation. The preserved sheep cells were washed free of Rous and Turner's fluid with sterile normal saline and suspended in the latter in such strength that the hæmoglobin liberated by distilled water and treated with CO was exactly twice the strength of that in the standard tube of a Haldane-Gowers hæmoglobinometer. This method allows of accurate standardisation of the test corpuscular suspension day after day when made from the same batch of preserved blood, the suspension of red corpuscles of this particular density being termed the "standard corpuscular suspension."

Complement was obtained from guinea-pigs with aseptic precautions. The blood after collection was allowed to clot and the separated serum centrifuged to free it from corpuscles. This serum was stored at the desired temperature, the amount necessary for each determination being withdrawn with a sterile pipette and immediately titrated. Each of the sera A, B, and C was obtained from a single healthy adult animal.

The immune body was a rabbit anti-sheep cell serum of high titre which was always used in the same dilution, so that three hæmolytic doses were present in each of the titration tubes.

Titration of Complement.

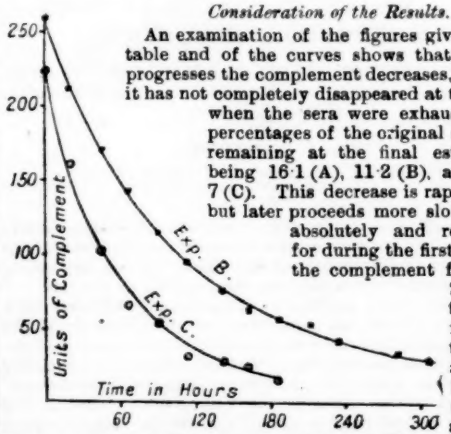
The complement-containing serum was so diluted as to cause standard hæmolysis in an amount between 1 c.cm. and 0·1 c.cm. of the dilution. Of this dilution 1·0, 0·8, 0·6, 0·5, 0·4, 0·35, 0·3, 0·25, 0·2, 0·17, 0·13, 0·1 c.cm. were measured into small test-tubes of similar diameter which already contained sufficient saline to make the total volume in each tube 1 c.cm. As a control another tube containing 1 c.cm. of saline was prepared. To each was added 1·5 c.cm. of a mixture of two parts of standard corpuscular suspension and one part of diluted immune body. The tubes were shaken, placed in a water-bath at 37° C. for two hours, then removed, shaken, and allowed to settle in the ice-chest till the following day, when the amount of serum required to produce standard hæmolysis was noted. Standard hæmolysis is equivalent to the hæmolysis of 60 per cent. of the added corpuscles. It was determined by comparing the colour in a similar tube containing 0·6 c.cm. of the standard corpuscular suspension hæmolysed and made up to 2·5 c.cm. with distilled water with the colours obtained in the titration tubes. It was thus found possible to make a very accurate estimation of the position of standard hæmolysis in the series by inspection. The strength of complement found in each specimen of serum is expressed in arbitrary units by multiplying the reciprocal figure of the actual amount of diluted serum giving standard hæmolysis by the number of times the serum was diluted.

The Experiments.

The experiments consisted in submitting complement as soon as it had been obtained free of cells (i.e., 21·5 hours after the collection of the guinea-pigs' blood) to temperatures of 9° C. in the case of sera A and B and 20° C. in the case of serum C, light being excluded. The temperatures were maintained as nearly constant as practicable until the removal of samples for titration had exhausted the specimens. The times at which the samples were taken and the number of units of complement found at the different intervals is recorded in the table for all three sera, whilst graphs of the results in the cases of sera B and C are also given. The duration of the experiments was, for A, 211 hours; for B, 305·5 hours; and for C, 186 hours.

Time in hours.	Exp. A. Temp. = 9° C.		Exp. B. Temp. = 9° C.		Exp. C. Temp. = 20° C.	
	Obs.	Calc. (n = 0·3).	Obs.	Calc. (n = 0·3).	Obs.	Calc. (n = 0·3).
0	279	278·8	258	258·8	222	222·3
19	228	225·5	214	214·4	161	155·1
44	174	173·9	171	170·0	102	101·8
66	140·5	140·5	143	140·3	66·5	73·1
90	113·1	113·0	115·3	115·1	52·6	52·7
114·5	79·8	91·7	95·2	95·2	31·5	38·9
143	72·9	73·1	76·9	77·3	28·2	28·2
162·5	62·3	63·1	62·5	67·5	24·2	23·0
186	53·3	53·3	57·5	57·7	15·0	18·3
211	45·5	44·9	52·6	49·3	—	—
234	—	—	42·9	42·9	—	—
282·5	—	—	33·3	32·5	—	—
305·5	—	—	28·7	28·7	—	—

Consideration of the Results.



An examination of the figures given in the table and of the curves shows that as time progresses the complement decreases, but that it has not completely disappeared at the times when the sera were exhausted, the percentages of the original strengths remaining at the final estimations being 16·1 (A), 11·2 (B), and about 7 (C). This decrease is rapid at first but later proceeds more slowly, both absolutely and relatively: for during the first 50 hours the complement falls from 279 units to 164 (A), from 258 to 151 (B), and from 222 to 93 (C)—i.e., a loss of 41 per cent. (A), 41·5 per cent. (B), and 58 per cent. (C), whilst during the same length of time between the 136th and 186th hours the fall in complement is from 77 units to 53·3 (A), from 83 to 57·5 (B), and from 30 to 18 (C), drops of 30·5 per cent. (A), 30·5 per cent. (B), and 40 per cent. (C).

These figures also prove that the loss is more rapid at the higher temperature, since Sera A and B were kept at 9° C. and C at 20° C., a point which is further emphasised by comparing the lengths of time required for a loss of 75 per cent. of the original strengths—i.e., 85 hours at 20° C. (C), 150 hours (A), and 169 hours (B) at 9° C, the loss at 20° C. taking about half the time which is required to produce the same change at 9° C.

The curves of loss of complementing power in the case of each serum are very regular throughout the ranges covered by the experiments (i.e., 1 to 1/6, 1 to 1/9, and 1 to 1/12), and the results are capable of being expressed by the formula $\frac{dx}{dt} \cdot \frac{1}{x^{n+1}} = K$, as can be seen in the table, where appear the figures calculated for each experiment from this formula after the graphic method given by Madsen.[7]

In this differential equation x is the amount of complement remaining after the lapse of t hours, n and K being constants.

Remarkable similarity is to be noticed between the results obtained experimentally and those calculated. In Experiment A, conducted at 9° C., there is only one point of marked deviation—namely, that at 114·5 hours, which seems to be due to some accidental experimental error. In Experiment B, also at 9° C., no error of such magnitude is present, the correspondence between observed and calculated results in both cases being highly satisfactory. Experiment C presents only moderate agreement between the calculated and the observed figures, but nevertheless is sufficient to indicate that the same formula may also hold good at 20° C., as will readily be seen by inspection of the table and the curve, in which the observed points and the theoretical curve are shown.

Conclusions.

1. A satisfactory method of estimating decreases in the complementing powers of sera over considerable periods of time has been devised.

2. Whilst kept normal guinea-pig serum loses its complementing power more rapidly in the early stages than the later, and at 20° C. than at 9° C., yet it retains its activity for a considerably longer time than has generally been conceded.

3. The loss of complementing power of such serum is perfectly regular and can be expressed by the formula— $\frac{dx}{dt} \cdot \frac{1}{x^{n+1}} = K$, at 9° C., and apparently also at 20° C.

References.—1. Emery: Immunity and Specific Therapy, London, 1909. 2. Ehrlich and Morgenroth: Ehrlich's Collected Studies, New York, 1906. 3. Muir and Ritchie: Manual of Bacteriology, London, 1913. 4. Noguchi and Bronfenbrenner: J. Exp. Med., xiii. 5. Massol and Grysez: Comptes Rendus Soc. Biol., lxviii., 1910. 6. Rous and Turner: J. Exp. Med., xxiii., 1916. 7. Madsen: Festskrift ved Indvielse af Statens Seruminstitut, Copenhagen, 1902.

KALA-AZAR IN MALTA: TWO CASES TREATED BY INTRAVENOUS INJECTION OF TARTAR EMETIC.

BY H. I. WINIFRED KERR, M.B., CH.B. GLASG.,
ATTACHED R.A.M.C.

ALTHOUGH the occurrence of the infantile variety of kala-azar in Malta is well known to medical men practising in the island, it was believed until recently that the adult variety did not occur. Lately several cases have been described among military patients in which the disease developed in Malta. One such has been described by Lieutenants Brodie and Yorke,[1] and Captain G. R. Ward has contributed to THE LANCET[2] a short note on two cases in which the disease developed after the return of the patients to England.

In the present paper two further cases are recorded. One patient came direct from England to Malta and had never been further East; the other patient had been invalided from Gallipoli with amœbic dysentery more than a year before he developed kala-azar, having been in "convalescent employ" in Malta. However, the cases acquire far greater interest and importance in that treatment by intravenous injection of tartar emetic, recently introduced by Sir Leonard Rogers,[3] was conspicuously successful, recovery being to all appearance complete and permanent. In Case 1 diagnosis was reached at an early stage, and the response to treatment was much more rapid than in Case 2, where patient was ill several months before treatment was initiated.

The recognition of kala-azar presents no special difficulty when one is on the lookout for it. In the early stages the diagnosis rests upon general weakness and wasting, with raised temperature, sweating, conspicuous splenic enlargement, and pronounced leucopenia, this consisting of a marked relative diminution of polymorphonuclears and relative increase of mononuclear cells. The characteristic temperature chart, with its double daily rise, does not become conspicuous until rather later. For confirmation of the diagnosis splenic or hepatic puncture is necessary. Relying upon the signs mentioned above the diagnosis of yet a third case in one of the military hospitals was made within a few days of the patient first reporting sick.

[1] R.A.M.C. Journal, January, 1917.
[2] THE LANCET, 1916, ii., 16.
[3] THE LANCET, 1916, ii., 782.

It is obvious that the treatment by tartar emetic should be resorted to in such cases as soon as the disease is recognised, for the cases here recorded tend to confirm its great value in a disease regarded hitherto as of specially evil prognosis.

CASE 1.—Sister B. Admitted Sick Sisters' Hospital Jan. 23rd, 1917. Age 29 years. Service 1 7/12 years. Had never been further east than Malta. Patient arrived on island in July, 1915; enjoyed good health till November, 1916, when she began to feel tired and more weary than usual. Slight cough in January, 1917; on Jan. 23rd T. 100·8° F. She reported sick. Nothing abnormal detected in heart or lungs. Abdomen moved freely; on left side was a mass, some doubt whether it was enlarged spleen or kidney. Urine acid; sp. gr. 1008; trace of albumin; a few granular and hyaline casts, no tubercle bacilli. She ran high T., which began to show indication of two rises in 24 hours from Feb. 12th; occasional rigor. Blood negative to Widal's reaction; no malarial parasites found. Diminution of both red and white cells; hæmoglobin fell from 52 to 30 per cent. Amenorrhœa for two months; no diarrhœa.

On findings of blood picture, the leucopenia, marked anæmia, suggestive temperature, with mass in left side, now undoubtedly an enlarged spleen, splenic puncture was advised; Leishman-Donovan bodies recovered. In neither case could these parasites be recovered from peripheral circulation, nor from serum of blisters.

On March 1st intravenous injections of 2 per cent. solution of antimony tartrate were commenced, and continued in increasing doses at four days' intervals, beginning with 4 c.cm. The first injection (2/3 gr.) was well borne; no marked reaction. By March 21st blood picture had improved; T. only slightly raised; patient had menstruated first time for three months. Spleen, which had been below umbilicus, had not altered much hitherto, but by March 24th lower border was 1 inch above anterior iliac spine. About April T., which had been normal, rose to 100°; an injection given at once checked relapse. After first six injections intervals between had been gradually increased and had evidently become too long.

By May 31st spleen was only four fingers' breadth below costal margin; left kidney again palpable, low and enlarged. By June 5th spleen was not palpable and remained so without further treatment. Regaining weight; no rise of T. Patient was subsequently returned home as a "walking case" and has now, we understand, resumed duty in a military hospital in England.

CASE 2.—Corporal C. Admitted Military Hospital, Imtarfa, Feb. 18th, 1917. Age 28. Service: 3 1/12 years. Foreign service: Egypt, September, 1914–August, 1915; Gallipoli, August, 1915–Oct. 28th, 1915; Malta, Nov. 3rd, 1915. Patient's health good during year in Egypt, and in Gallipoli till invalided with amœbic dysentery in October, 1915. On recovery stool examined at Camp Hospital; found to be carrier of *E. histolytica*. He was treated from May till July, 1916, at Imtarfa Hospital, being discharged back to Camp Hospital on July 9th, 1916. There he became a "convalescent employed" on orderly-room staff. There were plenty of fleas about, and a dog attached to the orderly-room slept frequently on his bed and had special attention as it was then suffering from "distemper."

About end of 1916 patient began to feel very tired; was getting thinner. In January, although taking quinine, 10 gr. daily, T. rose. In beginning of February he was having 20 grains daily; T. not controlled. Eventually he was sent into hospital again as case of P.U.O. Nothing abnormal in heart or lungs. In abdomen tumour below left costal margin, about hand's breadth downward. It was not tender; apt to vary in position. Patient markedly emaciated; a curious greyish complexion. Carefully charting, it was noticed that T. rose twice in 24 hours, often as high as 104° or 105°. No symptoms of dysentery; stool reports negative. Quinine given intramuscularly; no effect on T. Blood did not agglutinate dysenteries, typhoid, paratyphoid bacilli, nor *Micrococcus melitensis*. No malarial parasites found in films taken; marked leucopenia and anæmia. These, with spiking of temperature and enlarged spleen, led to suggestion of splenic puncture. On account of extreme debility hepatic puncture was resorted to and *L. donovani* recovered.

On March 7th treatment by tartar emetic in 2 per cent. solution (normal saline) was commenced with 4 c.cm. intravenously, increased by 2 c.cm. and given every three days, till 10 c.cm. were reached. Marked general reaction each time. Reactions, with patient's debility and nervous condition, induced one to try 1/4 gr. of morphine and 1/60 gr. of strychnine hypodermically, 20 minutes before injection. This had a good effect, quieting general reaction of coughing, retching, and hysteria, and abolishing entirely rigor which used to come on about two hours after injection. The 10 c.cm. dose had to be given within at least 60 to 90 seconds, or coughing and retching would begin, and it became impossible to keep needle directly in vein. Tartar emetic causes an intense inflammation should any escape, followed by cold abscess. Two of these occurred, but cleared up with treatment. There is less reaction when solution is heated to blood heat.

By March 26th patient was being given 10 c.cm. doses of tartar emetic, 2 per cent. solution; condition critical. T. still rose to 104° twice daily; P. 120. Heart sounds fairly good; no dilatation or murmurs. His condition got steadily worse. He suffered greatly from night sweats. As condition was desperate, drug was pushed to its limit, and on March 31st 12 c.cm. of solution were given, followed by 10 c.cm. every other day until April 16th, when T. rose once only to 101°. General condition much improved. T. did not rise again, and as his arms were very sore and suitable veins were not obtainable elsewhere a week's respite was allowed, during which time T. did not rise. Veins showed signs of inflammation and leakage at previous punctures where the solution had been given. 10 c.cm. and then 6 c.cm. were given at intervals of a week, but T. rose again with a smaller dose, with drowsiness and lack of appetite. On May 27th he was given 10 c.cm. and then 9 c.cm. of solution at interval of three days. This controlled relapse and two more doses completed this treatment. The spleen by July 11th was only just palpable below costal margin.

During treatment patient suffered from no skin eruptions nor rashes, no gastric disturbances, no diarrhœa, and no ophthalmic symptoms. He was transferred to England as a "walking case," and writes that he has now taken up former occupation. Except for the melancholy and depression, the antimony had no toxic effects, though given in such large and frequent doses; also no return of dysentery. Altogether he had 424 cg. of tartar emetic; 246 cg. of tartar emetic being used in Case 1.

Unless the period of incubation of kala-azar be longer than one year, we may safely conclude that in both cases the disease was contracted in Malta, and probably from the bites of insects. In Case 1 there was ample opportunity of being bitten by fleas and bugs, as the patient worked during the time that barracks were being converted into hospitals, and also during the height of the Gallipoli campaign, when patients were arriving direct from the firing line. In Case 2 one would specially incriminate the dog, with its fleas, though the parasite was never recovered from its peripheral blood. Both these cases occurred about the same time, at the beginning of the year 1917, but in different parts of the island.

I am deeply grateful to Dr. May Thorne, attached R.A.M.C., to whose kindness I am indebted for her notes on Case 1; also to Dr. E. J. Dalyell, attached R.A.M.C., who was responsible for the practical treatment of the case. I have to thank most of all Colonel Sir A. Garrod, F.R.S., but for whose aid these notes would be as yet unwritten; and also Colonel G. B. Price, officer commanding Military Hospital, Imtarfa, for kind permission to publish them.

Reviews and Notices of Books.

An Enquiry into the Analytical Mechanism of the Internal Ear. By Sir THOMAS WRIGHTSON, Memb. Inst. C.E. With an Appendix on the Anatomy of the Parts Concerned by ARTHUR KEITH, M.D., F.R.S. London: Macmillan and Co., Ltd. 1918. Pp. 254 + 9. Price 12*s.* 6*d.*

SINCE 1863, the year in which Helmholz published his classic on the physiology of hearing, much work has been done on the finer anatomy of the cochlea, but hitherto no corresponding advance has been recorded with regard to the physiology of hearing. There has been an increasing rejection of the Helmholz theory, especially among those with large clinical experience of the disorders of hearing, but no valid new theory of the mechanism of hearing has been proposed. The heart of the difficulty has been the question of the resolution in consciousness of compounded vibrations into their constituents. Helmholz saw no method by which this was possible, except his postulate of sympathetic vibration in the cochlea. As a physiological means for this he found no structure but the fibres of the basilar membrane, and in spite of the obvious difficulties he was content to accept it and build on this foundation. The foundation was unsatisfactory, and the theory of hearing has remained hampered by this moribund faith. We are now in a position to welcome a distinct and better theory. Sir Thomas Wrightson has been able to bring an almost life-long study of aerial wave-form into combination with an engineer's survey of the cochlea viewed as a machine. Professor Keith, in his luminous appendix, has clarified the anatomical considerations and strengthened the position of the theory by a consideration of the comparative anatomy of the cochlea.

In the consideration of the Wrightson theory the first point to be grasped is the real nature of the sound wave. The ordinary graph of a simple tone is a simple "zig-zag" wave-line, and, as Professor Keith acknowledges in his own case, has generally been misinterpreted as implying a stimulus in hearing of two phases, at the top and bottom of the alternating curve. This error has led to much difficulty. The "wave" is really a pressure variation passing from a zero position to a maximum, reversing direction, passing through zero, continuing to a minimum, reversing once more, and returning to zero. There are thus in the cycle not two but four positions of definite change and so of stimulus, at the maximum and minimum and at the crossing of the zero lines, at each of which points the direction of change is reversed. Now when two simple tones are sounded together their respective wave-forms are combined into a graph which varies in outline with the phase position in which the two curves happen to overlie each other, and at first, in even so simple a case, the result is indecipherable. By means of an ingenious machine which he calls an "ohmograph" Sir Thomas Wrightson has recorded a very large number of such compound curves of varying complexity, and has applied the four-stimulus theory to their analysis. In the result he has been able to show that while the resultant curves lose all obvious relation to the elementary curves which are plotted beside them by the machine, they are still capable of analysis, and show the survival of the changes of direction of their constituents. In other words, the compound wave may still be regarded as the simultaneous occurrence of the original rhythms, and if we grant a preferential consciousness for rhythmically repeated auditory stimuli all we need demand in the cochlea is an apparatus capable of yielding a stimulus at every change of direction in the pressure wave, simple or compound, as it arrives at the ear.

Turning now to the more directly physiological part of the inquiry, both authors accept the usual interpretation of the tympanic structures in its broad outlines. Two points need mention: the footplate of the stapes acts not as a piston, but as a hinged plate moving round its antero-inferior border, and the intrinsic muscles form an opposed pair, the tensor tympani pushing in the footplate while the stapedius pulls it out. The mean position is thus one of extreme instability, capable of being affected by the smallest pressures in either direction within a limit determined by the tension of the muscles. An important accessory resistance, not noticed by either author, is afforded by the radial fibres of the membrana tympani. The pressure variations of the sound wave thus arrive in all their complexity and fineness and are transmitted without change of period. At this point they pass from an elastic compressible medium to an incompressible one, and their physical character undergoes a corresponding change, and becomes a movement of direct translation of the perilymph. This perilymph pulse passes from the footplate of the stapes to the membrane of the round window, and in its passage evokes the essential stimulus. The elucidation of the nature and mechanism of this stimulus is the central point of the theory.

In relation to this problem Professor Keith in his appendix reviews the history of our knowledge of the structures of the scala media of the cochlea. The inadequacies of the Helmholz theory of resonators provided by the fibres of the striate zone of the basilar membrane are reviewed once more. The question is what are the physical happenings in the cochlea under the passage of a single pulse of sound. Clearly a displacement wave commences at the footplate during the compression phase and passes to the secondary membrane, subsequently reversing and bringing the footplate of the stapes back to its mean position, the volume displacement of the secondary membrane being equal to that of the footplate. But by what path is the volume movement transmitted? Neglecting the lax and easily displaced membrane of Reissner, the cochlea may be considered as two adjoining passages, closed as to one pair of ends by the footplate and the secondary membrane respectively, and communicating at their other ends by the narrow vent of the helicotrema. The party wall between the two passages is formed in part by the rigid bony shelf of the lamina spiralis ossea, in part by the basilar membrane. The latter again falls into two subdivisions, an inner elastic arcuate zone and an outer firmer striate zone. Standing on and practically limited to the arcuate zone is the organ of Corti, overhung by and in contact with the tectorial membrane. The aperture of the helicotrema is small and remote from both the moving diaphragms in the two windows; and the fluid friction involved in the passage of waves through the whole length of the double passage and the throttle hole of the helicotrema would probably damp out all but the strongest vibrations. On the other hand, the displacement will pass readily and directly from the upper to the lower passage across the membrana basilaris, displacing it correspondingly according to the phase of the pulse. The finer structure of the membrana basilaris is shown by Professor Keith to be admirably adapted for such elastic displacements. Accepting this, what happens in the organ of Corti? This has been elucidated by both authors, but with fine analysis by Professor Keith using scale models. It is shown that owing to the form and structure of the basilar membrane and to the arrangement of the rods of Corti and the supporting fibres of Deiters, the upward and downward swing of the membrane is transformed into a lateral movement of the surface of the organ of Corti. From this surface project the hairs of the sensory hair-cells, passing into the under surface of the relatively fixed tectorial membrane. The hair-cells with their supports thus move laterally under the tectorial membrane with each pulse of the sound wave, the hairs are deflected in correspondence with these movements, and undergo a change

in direction of the process of deflection at each of the four "stimulation points" of the complete cycle of a simple sound wave, and at each of the corresponding multiple points of a compounded sound curve.

In summary, the authors have discovered a mechanism which is capable of registering every complexity of the compounded wave and of passing it on to the sensorium in accurate record as nerve impulses. The final process of the appreciation of these impulses as simple or compounded and harmonised notes is of course central. In this beautiful theory we have at last an intelligible account of the genesis and nature of the peripheral stimulus concerned in the sense of hearing. It is, moreover, of special interest that the nature of the stimulus in the cochlea is essentially the same as that in the primitive mixed vibrational and positional organs of such creatures as the crustacea, and as that of the sister tracts in the vestibule and semicircular canals. We rejoice that we can claim so important a theory as British.

A Manual of Bacteriology, Clinical and Applied. By R. TANNER HEWLETT, M.D., F.R.C.P., &c., Professor of Bacteriology in the University of London, Director of the Bacteriological Department, King's College, London. Sixth edition, with 31 plates and 69 figures in the text. London: J. and A. Churchill. 1918. Pp. 769. Price 14*s.* net.

THIS manual is intended to provide such information in bacteriology as is required by the medical student, the practitioner, and the medical officer of health, and as it has now reached its sixth edition proof is not wanting that it has served its purpose. The difficulty in deciding how much of the large amount of work which is being produced at the present time is of permanent value has made the re-editing a task of considerable complexity. War problems have largely determined the direction of medical research, and the chapter on anaerobic organisms, which have been found so closely related to war injuries, has received certain additions. To some these additions may appear disappointingly small, though both Weinberg's and Fleming's researches are included. We may suggest, however, to the author that if the new methods he has incorporated really denote an improvement in technique older methods might have been deleted for them and more stress laid upon the advantages of the new. Bacteriology is making rapid strides forward, and a time must come for the bold remodelling of a popular text-book, along with the abandoning of older and less exact methods of technique. The responsibility of the teacher in this respect is especially great now that the reading of a text-book so largely takes the place of attendance on systematic lectures.

In view of the interest excited by "epidemic stupor" the section on *B. botulinus* will probably be enlarged in a subsequent edition. The production of anaerobic conditions of culture by the use of palladium black finds a place in the chapter on methods, and this chapter has received several other important additions. Epidemic cerebro-spinal fever has furnished another war problem, and the chapter on this subject has been rewritten, while there has also been considerable alteration in the section dealing with the typhoid-colon group of organisms, together with a greatly extended table of the fermentation reactions of this group. The Oxford standard method of agglutination also naturally now finds a place. There are a number of other alterations and additions, including Chalmers's classification and nomenclature of the streptothrix infections and fuller details of the Wassermann reaction in the section on syphilis. New figures and plates have been introduced where required. The book is well produced, and leaves little to be desired in its method of presentation.

Laboratory Studies in Tropical Medicine. By C. W. DANIELS, M.B. Camb., F.R.C.P. Lond.; and H. B. NEWHAM, M.D. Dub., D.T.M. & H. Camb. Fourth edition, thoroughly revised. London: John Bale, Sons, and Danielsson. 1918. Pp. 560. Price 21*s.* net.

Dr. C. W. Daniels in his preface to the first edition of these studies stated the object of the work to be to assist practitioners in the tropics in the application of simple laboratory methods to the practice of medicine. The book therefore ranged over a large variety of loosely-bound-together subjects, including, amongst others, post-mortem examinations, parasites found in the blood and tissues and their life-history, fæces, intestinal parasites, bacteriology, measurements, and statistics. Advances in tropical medicine have been rapid and the book has been revised in the third and again in the present edition with the assistance of Dr. H. B. Newham, director of the London School of Tropical Medicine. The authors express the hope that it may be of service to the many practitioners now meeting tropical disease for the first time in the various theatres of war.

But while it contains much useful information and is lavishly illustrated, the book should not be considered in the light of a complete guide to laboratory practice. It fails to be so by attempting to deal with too many subjects, much space being consumed in elementary teaching, such as the method of making a platinum loop, familiarity with which might be assumed in the class of reader to whom address is made. While sections on protozoology, helminthology, entomology, hæmatology, mycology, pathology, water analysis, and a variety of other miscellaneous subjects are included, to mycology, a difficult subject and one unfamiliar to the non-expert, less than five pages are devoted. Those who require to investigate a case of bacillary dysentery, paratyphoid, or plague will find little or no help in the book. Information about the cholera organism is limited to the fact that it is motile and liquefies gelatine. The description of amœbic and other protozoal cysts in fæces is incomplete and devoid of figures, while a scheme of life cycle of *A. coli* is included which cannot be said to be yet established. Misleading statements also are present: e.g., on p. 69 we find it stated that "Maurer's bodies" stain blue with Romanowsky's stain, and that lymphocytes contain no azure granules; on p. 201 (Fig. 84), in the transverse section of the proboscis of *Glossina palpalis*, some of the parts shown are in the right position, others are upside down.

In making these criticisms we do not imply that a book which has reached a fourth edition is not filling a useful place, but we suggest that a careful revision would tend to greatly increase its value.

Treatment of Gonorrhœa. By N. P. L. LUMB, Temp. Capt., R.A.M.C. London: H. K. Lewis and Co., Ltd. 1918. Pp. 120. Price 4*s.* 6*d.*

THIS book is written with a view to helping those in charge of venereal clinics whose previous knowledge of up-to-date methods may have been limited. The book satisfies the need for which it was written; it is of a convenient size, and the necessary information is compactly condensed and is commendably devoid of theoretical considerations.

The methods of diagnosis and treatment not only of gonorrhœa, but also of its local and generalised complications, are gone into. All the modern methods of diagnosis and treatment are described in detail and the reason for their use explained. There is rather a tendency in the book to suggest that vaccine-therapy is of primary importance, which may or may not be the view of the author, but to some it will appear that this importance is a little unduly emphasised. Valuable enough as vaccines may be, although this is debatable, it is a little unwise even to suggest to the mind of those who are not familiar with their use that they play a prominent part in the treatment of localised gonococcal infection. To lay too much stress on their use and omit the other forms of treatment is a perilous error. The book deserves to be well received by those for whom it is written; it is full of practical counsel.

A History of Departed Things. By Mrs. HENRY HEAD. London: Kegan Paul, Trench, Trübner, and Co., Ltd. 1918. Pp. viii. + 242. Price 3*s.* 6*d.* net.

THIS record of a woman's thoughts and experiences, expressed in letters, will appeal to medical readers on many grounds. The heroine, the daughter of an Oxford professor, is twice married, and both husbands are members of the medical profession. The glimpses into Harley-street life and into the work of country medical practice are truthful and attractive. The heroine is a living, loving, much troubled woman, and her story a psychological study of temperament and disposition. In selecting the epistolary form of presentation Mrs. Head has taken grave risk, but the result justifies the experiment, as her work will bring refreshment to harassed and tired minds.

JOURNALS.

The Journal of Physiology. Edited by J. N. LANGLEY, D.Sc., F.R.S. Vol. LII., No. 1. Cambridge: University Press. 1918. Pp. 1–74. Price 7*s.*—The Guanidin Content of Muscle in Tetania Parathyreopriva, by Pearl S. Henderson. The symptoms of tetania parathyreopriva have correlated with the action of guanidin on the spinal cord, while an increase of guanidin in blood and urine has also been observed. The author finds that there is a fall in the total and in the free guanidin of muscle and a rise in the creatin. The fall in the total guanidin is far in excess of the nitrogen in free guanidin and creatin, and must indicate either a liberation of guanidin from the muscle or a failure in the power of the muscle to take up guanidin formed elsewhere, either of which may be correlated with the increase in the blood and urine.—The Velocity Factor in Cardiac Work, by C. Lovatt Evans. The energy expended in imparting velocity to the blood is very considerable, both under experimental conditions in animals and in the human heart during exercise.—Observations on the Atrophy of Denervated Muscle, by J. N. Langley and M. Hashimoto. This elaborate research extends to over 50 pages, and deals with so many aspects of the question that in the space at our disposal we can only refer to a few of the authors' conclusions. After describing the two methods—bilateral and unilateral denervation—in animals to determine to what extent a given treatment retards the atrophy of denervated muscle, the authors describe their results in bilateral denervation and the effects of some forms of treatment, such as ionisation with calcium and potassium salt, Ringer's fluid, rhythmic flexion, and extension and massage. In unilateral denervation the rate of atrophy, absolute and relative, in different muscles, is discussed. The normal difference in weight of the muscles of the two sides usually varies within rather narrow limits. The chief difficulty in experiments on the leg of the rabbit is that of preventing trophic changes in the foot and skin of the leg. Reviewing the effect of the various forms of treatment tried by them, the authors think "there is only one which gives any hope of considerably reducing the rate of atrophy—viz., ionisation with a potassium salt, and that is slender." The impression they got from the present and past experiments is "that none of the methods of treatment of denervated muscle now in use—passage of galvanic current, production of contraction, passive movements and massage—can have more than a slight effect of delaying muscle atrophy." On the Creatin Content of Skeletal Muscle in Degeneration following Denervation, by E. P. Cathcart, P. S. Henderson, and D. Noël Paton. Most of the experiments were made on cats, a piece of one sciatic nerve being removed to prevent regeneration. Up to the eleventh day there seems to be no distinctive change in the creatin content of muscle. After the fifteenth day, when the reaction of degeneration is well established, there is a steady and progressive decrease in the creatin content. The results point to the association of creatin with the sarcostyle element of the fibre.

The American Review of Tuberculosis. Baltimore: National Association for the Study and Prevention of Tuberculosis. Price 35 cents.—The April issue contains three papers on Artificial Pneumothorax. Dr. W. B. Kendall and Dr. C. C. Alexander, with an experience of 131 cases, report favourably on this treatment. They reserve it, as a rule, for severe or moderately severe cases, but in one early case they resorted to this measure to check a troublesome cough that had been refractory to other treatment.—Dr. Saling Simon and Dr. Samuel Swezey record a case of Pulmonary Abscess treated with artificial pneumothorax. The beneficial results were dramatically rapid and permanent.—In a paper on Pleural Shock Dr. J. B. McKnight, Dr. H. F. Gammons, and Dr. W. M. Knowles give an account of the one case of pleural shock observed by them in a series of 65 cases and about 800 punctures of the chest. It has been their practice to inject cocaine in every case, but not to give a preliminary injection of morphine. Their patient was a nervous young man, who had already been given several injections of air. At one operation the manometer showed no oscillation, and the operator was therefore about to withdraw the needle when the patient suddenly sat up without warning. Then he sank back unconscious, frothing at the mouth, breathing stertorously, and exhibiting tonic contractions of the whole body. For two days there was complete loss of vision. The authors regard the ocular symptoms as indicative of hysterical amblyopia, and they assume that the case was one of pleural shock, not embolism, because no gas had been introduced through the exploring needle. They do not mention the possibility that the needle may have wounded a blood-vessel into which inspired air may have been sucked. Their treatment included an injection of gr. ¼ of morphine, which proved useful.—In a paper on elementary conceptions of tuberculosis Dr. A. K. Krause pleads for systematic supervision in after years of children who have successfully run the gauntlet of infection in infancy, but who, if left to themselves, will swell the ranks of the adult consumptives.

New Inventions.

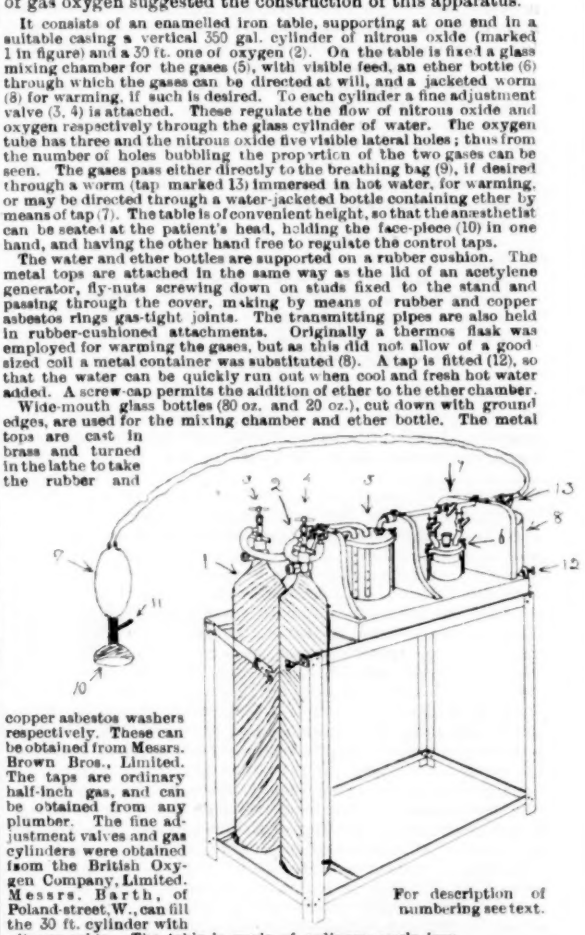
A COMBINED GAS-OXYGEN, GAS-OXYGEN-ETHER AND WARMED-ETHER APPARATUS.

THE success obtained by Gwathmey by the administration of gas oxygen suggested the construction of this apparatus.

It consists of an enamelled iron table, supporting at one end in a suitable casing a vertical 350 gal. cylinder of nitrous oxide (marked 1 in figure) and a 30 ft. one of oxygen (2). On the table is fixed a glass mixing chamber for the gases (5), with visible feed, an ether bottle (6) through which the gases can be directed at will, and a jacketed worm (8) for warming, if such is desired. To each cylinder a fine adjustment valve (3, 4) is attached. These regulate the flow of nitrous oxide and oxygen respectively through the glass cylinder of water. The oxygen tube has three and the nitrous oxide five visible lateral holes; thus from the number of holes bubbling the proportion of the two gases can be seen. The gases pass either directly to the breathing bag (9), if desired through a worm (tap marked 13) immersed in hot water, for warming, or may be directed through a water-jacketed bottle containing ether by means of tap (7). The table is of convenient height, so that the anæsthetist can be seated at the patient's head, holding the face-piece (10) in one hand, and having the other hand free to regulate the control taps.

The water and ether bottles are supported on a rubber cushion. The metal tops are attached in the same way as the lid of an acetylene generator, fly-nuts screwing down on studs fixed to the stand and passing through the cover, making by means of rubber and copper asbestos rings gas-tight joints. The transmitting pipes are also held in rubber-cushioned attachments. Originally a thermos flask was employed for warming the gases, but as this did not allow of a good sized coil a metal container was substituted (8). A tap is fitted (12), so that the water can be quickly run out when cool and fresh hot water added. A screw-cap permits the addition of ether to the ether chamber.

Wide-mouth glass bottles (80 oz. and 20 oz.), cut down with ground edges, are used for the mixing chamber and ether bottle. The metal tops are cast in brass and turned in the lathe to take the rubber and copper asbestos washers respectively. These can be obtained from Messrs. Brown Bros., Limited. The taps are ordinary half-inch gas, and can be obtained from any plumber. The fine adjustment valves and gas cylinders were obtained from the British Oxygen Company, Limited. Messrs. Barth, of Poland-street, W., can fill the 30 ft. cylinder with nitrous oxide. The table is made of ordinary angle iron.



For description of numbering see text.

For warm and intratracheal ether a No. 2 Fletcher blow-pipe bellows is attached to the nitrous oxide pipe. If desired, a pressure gauge can be screwed to the ether chamber. Oxygen can be administered at the same time.

The technique is as follows:—A preliminary narcotic of morphia 1/12 gr. and atropine 1/100 gr. is given 20 to 30 minutes before. The valves are regulated so that four nitrous oxide holes and one oxygen hole are bubbling. The breathing bag is lightly filled with this mixture.

A Bellamy Gardner mouth-prop is introduced and a well-fitting face-piece applied. The Colman gas valve (11) is turned to valves and the bag kept moderately distended. After about 10 respirations re-breathing can be commenced, turning to valves at every 7 to 10 respirations. The proportion of nitrous oxide to oxygen is usually kept at 4 to 1, the colour of the patient being the guide for additional oxygen. Cyanosis should not be permitted.

To deepen the anæsthesia the ether taps can be opened; this need be but for a few respirations. During the division of nerves or bone cutting it is advisable also to pass the gases through the ether. Re-breathing to a certain extent is good for the patient. Practically about one third of the volume of each respiration should be of freshly added gas mixture. With less there is a liability (in long cases anyway) to post-operation headache and nausea.

The advantage of nitrous oxide and oxygen, with re-breathing and ether, when necessary, has been demonstrated by Gwathmey, Page, Flemming, and Boyle. For nerve resections, amputations of the breast, removal of sequestra, varicose veins, it seems ideal. Where perfect relaxation is needed, as in gall-bladder operations, orthopædic wrenchings, appendicectomies, hysterectomies, it is not so suitable, though it can be given for this purpose.

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THE LANCET.

LONDON: SATURDAY, JULY 13, 1918.

Modern Views on Diabetes.

DIABETES has long been known to be characterised by the excretion of glucose, and the usual treatment of the disease has been by the elimination of carbohydrate from the diet. Nevertheless, patients still excrete sugar, and we shall be excused if we enumerate, for the sake of clearness, the views which are generally accepted on this matter. The source of the sugar has been traced to protein. Protein consists of some 18 amino-acids; some of these, such as glycocoll, alanine, glutamic acid, are converted into glucose not only in experimental animals (depancreatised, phloridzinised), but also in diabetic patients. Others are not convertible into glucose. Another origin of carbohydrate is fat; such a transformation occurs in hibernating animals and has been found to take place in some diabetics; it is not of outstanding importance. The glucose excretion is not the only symptom of diabetes. In severer cases the acetone bodies, acetone, aceto-acetic acid and β-oxybutyric acid, are produced and excreted. Acetone is a decomposition product of aceto-acetic acid and is not the primary product. Aceto-acetic acid and β-oxybutyric acid are interconvertible in the body, but the main conversion in the body is that of aceto-acetic acid into β-oxybutyric acid by the process of reduction. The liver is the organ which is mainly, if not entirely, concerned in this mechanism. Aceto-acetic acid is the primary product; β-oxybutyric acid is the safeguard. The production of acid was formerly attributed to be the cause of diabetic coma, hence the treatment with sodium carbonate, which was not really effective. Acidosis is not the cause of coma, but the toxic action of aceto-acetic acid. The term ketosis, as aceto-acetic acid is a ketonic acid, is suggested to distinguish this action from acidosis. The fat of the food has been proved to be the source of the aceto-acetic acid, but it may also arise from protein. Though aceto-acetic acid can theoretically be derived from carbohydrate, this source may be excluded. To sum up—the glycosuria arises from the carbohydrate and the protein of the diet, ketosis from the fat, and, to a small extent, from the protein. The diabetic may be described as an individual who utilises sugar too slowly; in the absence of carbohydrate more protein and fat are catabolised than normally and more aceto-acetic acid is produced; this acid is difficult to catabolise and is reduced to oxybutyric acid; the oxybutyric acid is excreted instead of being oxidised in the normal way. The work on which many of these categorical statements are based was done by HURTLEY.

Diabetes is therefore a general disorder of the metabolism; the patient cannot properly utilise carbohydrate, he produces carbohydrate from protein, and, further, he produces aceto-acetic acid from fat. It would follow that the rational treatment of diabetes is to curtail the amount of all kinds of foodstuffs to the lowest possible limit, so as to reduce the quantity of the excretory products. This is the modern treatment of the disease as described by Dr. E. P. POULTON in the Goulstonian lectures.[1] It has met with a considerable amount of success. Fatal cases in Guy's Hospital have been reduced from 23 per cent. in the ten years before 1916 to 7·7 per cent. since 1916, owing to the adoption of treatment by fasting. Similar results have been recorded in other hospitals. By the fasting treatment carbohydrate disappears from the urine, and there is less aceto-acetic acid. By careful addition of carbohydrate to the diet it is possible easily to determine the carbohydrate tolerance of the patient. He may be able to assimilate, say, 50 g. of carbohydrate, but not 100 g.; as soon as this is determined he is given the right amount in his diet. Similarly, the protein and the fat are adjusted. On these small diets the patient does not receive the caloric value of food which is considered necessary to maintain life. By careful treatment he may be made to take from 1500 to 2000 calories, the lowest limit for the normal individual. A considerably reduced amount of food has been shown to be capable of maintaining life without loss of efficiency.

Success has thus followed the application of the results of biochemical research, but the research on diabetes is not yet finished. It has depended on the chemistry of the proteins and the fats. Proteins have always been regarded as a source of both good and evil to mankind. The diabetic produces sugar from protein; yeast produces fusel oil; bacteria produce toxins. Proteins are indispensable for nutrition; there is no life without the amino-acid tryptophane; growth is dependent upon lysine; arginine and histidine are also essential to life, and they may be precursors of uric acid. In considering the protein moiety of the diet its quality is the most important factor. No two proteins are alike in their composition, just as outwardly eggs are not like meat; they are wrongly reckoned as alternatives in judging food values. Obscure points in other diseases have been cleared up by a knowledge of proteins, especially diseases of deranged metabolism. The biochemistry of fats, which is now in its beginning, is sure to throw more light upon normal metabolism and upon disease. The actual stages of oxidation of fat in the body are unknown, though much experimental work has been done. Minute biochemical research in the future will clear up this ignorance and abolish the numerous useless and unnecessary theories which impede progress rather than advance knowledge, since they simulate and are mistaken for facts.

[1] See THE LANCET, June 22nd and 29th, 1918, pp. 863 and 895 respectively, and the opening columns of the present issue.

The Medical Treatment of Elementary School Children.

THE Committee stage of Mr. HERBERT FISHER'S Education Bill was completed in the House of Commons on Wednesday, July 3rd. The Bill is in effect as much a Health Bill as an Education Bill, and when passed into law will very largely extend the health functions of the local education authorities. Some little time ago attention was drawn in these columns to the unfortunate omission in recent legislative enactments to provide for the care of crippled children, and the view was expressed that the urgency for provision for such children need only be brought to the notice of Mr. FISHER in order to secure the insertion in the Bill of a clause relating to them. It is gratifying to note that a new clause extending the provisions of the Education (Defective and Epileptic Children) Act, 1914, so as to apply to physically defective and to epileptic children was moved by Major HILLS and readily accepted by Mr. HERBERT LEWIS on behalf of Mr. FISHER.

An important discussion also took place upon the medical treatment of school children. The Education (Administrative Provisions) Act, 1907, placed upon all local education authorities the duty of providing for the medical inspection of children in the elementary schools, but, while empowering the authorities to provide medical treatment for those children needing it, imposed upon them no obligations in the latter respect. Mr. ROWNTREE proposed to include in the present Bill a clause making it obligatory upon the local authorities to provide treatment. Mr. FISHER, however, was in the first place indisposed to accept the new clause on the ground that the Board felt that they should leave the progress and development of medical treatment to voluntary action. He claimed that the progress already made justified that attitude. In support he quoted figures which showed that while in 1908 there were 55 local education authorities making arrangements for medical treatment, the number doing so in 1916 had risen to 216. A further consideration affecting the attitude of the Board was the difficulty of defining the particular ailments to be treated. Considerable pressure was in the course of the debate exercised upon the President of the Board to alter his decision, and eventually he undertook, in view of the large body of opinion in favour of Mr. ROWNTREE'S clause, to review the position and see whether he could bring forward on the report stage proposals which were watertight and administratively possible. As Mr. FISHER suggested, the exact definition of the limits within which the local education authorities must provide treatment will be no easy task. The remedial activities hitherto voluntarily undertaken to any extent have included refraction work, dental treatment, X ray treatment of ringworm, operations on tonsils and adenoids, and nursing treatment of the somewhat indefinite class of complaints which have been termed "minor ailments." Not all authorities undertaking treatment, of course, have covered the whole ground; there are, for instance, only 35 which provide operative treatment for tonsils and adenoids. Dental treatment, owing to the quite inadequate facilities which at present everywhere exist, will no doubt first claim the attention of the Board. Refraction work, owing to the importance of visual defect as an educational bar, will probably present no difficulty, as the Board have already indicated that refraction is to be looked upon as an extension of medical inspection rather than as treatment. Operations for tonsils and adenoids and X ray treatment for ringworm, however, will not be easy to decide upon.

The difficult question here arises as to parental responsibility. If the education authority must provide, must the parents also submit? The public treatment of minor ailments presents its own special difficulties owing to the possibility of encroachment upon the domain of private practice—a very important consideration and one which has already made itself heard in the discussions on the Bill in connexion with the extension to adolescents of the provisions for remedial care already enjoyed by the elementary school children. It will be seen, therefore, that the whole problem teems with difficulties, and Mr. FISHER'S hesitation in regard to it is readily understood. The results of his promised survey of the question will be awaited with some interest.

A National Scheme of Industrial Medical Research.

SIGHT should not be lost of a sentence in the final report (Cd. 9065. Price 2s.) on Industrial Health and Efficiency of the Health of Munition Workers Committee over which Sir GEORGE NEWMAN presides. In the Committee's view, the sentence runs, it is necessary to make arrangements without delay for a national scheme of industrial medical research, and to accord fuller recognition to the importance of industrial hygiene. It is now more than a century since the Health and Morals of Apprentices Act was passed, and the Committee disclaim the suggestion that the ideas embodied in their report are new and untried or in any way their own invention. A great national emergency gave them an opportunity of applying in a thorough way to munition work the knowledge of industrial hygiene of a century and of thus entering into other men's labours. But the report goes on to say that while the Committee fully recognise the debt owing to the great hygienic workers of the nineteenth century it remains true that up to 1914 little attention had been paid by employers and others responsible for industry to the steadily accumulating evidence of the influence of occupation upon health, and little effort had been made scientifically to investigate its causes. This neglect must now cease. The munition worker is a type of all workers, and the principles of the Committee's report concern all forms of industrial labour. There is imperative need for a firmer and more comprehensive grasp of the whole problem of health and physique in relation to industry. And to this grasp a national scheme of industrial medical research, combining all such powers as those granted in the Silicosis Bill just passed by the House of Commons, is an essential preliminary.

Annotations.

"Ne quid nimis."

THE PREVAILING PANDEMIC.

THE clinical features of the infectious febrile complaint which has invaded this country are sufficiently well known, and the following brief accounts by our Paris and Belfast correspondents suggest that they are dealing with the same malady.

Paris.—A widespread epidemic of *grippe* in a mild form is at present invading Paris and a large part of France. It is probably an extension of the epidemic which has recently attacked the whole population of Spain, from the highest to the lowest. The cases are very numerous, but none so far of a grave nature. Complaint is made of headache, pain in the back, naso-pharyngeal catarrh which is persistent but rarely invades the lower respiratory tract. The temperature is moderately raised, dropping at the end of two days. The resulting indisposition, which seems to be spreading to the troops at the front, fortunately lasts at most a few days.

Belfast.—An extremely widespread epidemic of what is called "influenza" is prevalent in Belfast and surrounding districts. The number of deaths in Belfast for the week ending June 29th was 341, and of these 92 were from "pneumonia" and 75 from "other diseases of the respiratory system." It began apparently in the military barracks at first, but soon spread to munition works, mills, &c., and thence all over the city and surrounding areas. The symptoms are mainly high temperature with a sudden onset, congested eyes, sore-throat, and headache, with muscular pains, and in uncomplicated cases the duration of the fever is about three days. Occasionally there are sickness and bronchial catarrh, but pneumonia is not common. It resembles influenza in its sudden onset and its widespread epidemic character, but differs from former visitations of that disease in comparative absence of chest complications and post-febrile depression. The locus of the disease seems to lie in the throat, at the junction of pharynx and larynx. Bacteriological examination so far has shown the presence of diplococci, streptococci, and pneumococci, but no specific organism. It is being recommended to close the primary schools—a measure as little likely to be effective as shutting down the banks, mills, munition works, and cinemas. The epidemic seems very like the Spanish one recently reported.

The paper by Captain T. R. Little, Captain C. J. Garofalo, and Captain P. A. Williams, of the Canadian Army Medical Corps, which appears in another part of our present issue, is the first serious contribution which we have seen to the bacteriological study of the pandemic. These authors deal with about 1000 cases occurring in several camps served by their mobile laboratory. After setting out three points in which the clinical symptoms differed from those generally ascribed to Pfeiffer's bacillus, the statement is made that in all the cases studied one organism predominated in direct smears taken from naso-pharynx, throat, and sputum. This was a small Gram-positive diplococcus, flattened on its opposing surfaces. It was found to grow freely on legumin serum-agar plates, forming small transparent granular colonies closely resembling those of streptococcus. No colonies of *B. influenzæ* were discovered. The authors are now working to establish Koch's third postulate in relation to the organism. It is noteworthy that Dr. A. MacLean, who contributes to this present issue a memorandum on an outbreak of an acute febrile disease in certain Glasgow factories, has also found a diplococcus, in this case Gram-negative, in association with it. The disease, of which he dealt with 436 cases, was of a very mild type, characterised by sudden onset with severe headache and prostration, followed by rapid recovery in 2–4 days. No death was recorded, but a similar outbreak was brought to his notice in the county of Lanark, in which 8 deaths occurred in 280 cases. Acting under Dr. A. K. Chalmers, medical officer of health for Glasgow, Dr. MacLean is studying further the bacteriology of the outbreak. We commend both these series of investigations to the attention of bacteriologists in general. The loose application of the term "influenza" to a febrile infection in which Pfeiffer's bacillus cannot be demonstrated is, to say the least, unfortunate and we have always deprecated its use, suggesting as an alternative the term "catarrhal fever."[1] Mild though the present form of the malady is in a vast majority of cases, its death-rate has not been insignificant, and its epidemiology is a matter of very pressing importance.

ECGONINE AND ITS DERIVATIVES.

THE Home Secretary has given notice that the definition of "cocaine" in Defence of the Realm Regulation 40 B (which regulates dealings in cocaine and opium) and in the Proclamation prohibiting the importation of cocaine has been further amended so as to include ecgonine, its salts and derivatives. The definition now reads as follows:—

"Cocaine includes ecgonine and any substance, whether preparation, admixture, extract or otherwise, containing 0·1 per cent. (one part in a thousand) or more of cocaine or ecgonine or of any salt or derivative thereof."

Ecgonine is the parent of cocaine, which is benzoyl-ecgonine methyl ester. There are many other derivatives of ecgonine in the leaves of *Erythroxylon coca*, from all of which ecgonine can be separated. Cocaine is obtained economically from ecgonine by a synthetic process, using methyl alcohol and benzoyl chloride. Ecgonine is the essential pharmacological group of the alkaloid.

THE DEVELOPMENT OF THE MEDICAL PROFESSION: THE CAVENDISH LECTURE

Major-General Sir Bertrand Dawson, in delivering the Cavendish lecture this year before the West London Medico-Chirurgical Society, found that the subject which he had selected could not be intelligibly expounded within the compass of one lecture, with the result that on Thursday evening he continued at the Royal Society of Medicine his Utopian picture of the future of the medical profession in this country. At the West London Hospital, where he had a large audience, he made the following point in an incontrovertible manner—that the growth of knowledge had rendered medical effort, whether for treatment or prevention, a combination of energies. No man any longer can pretend to have particular equipment or special knowledge by which he can do the best possible for all patients in all circumstances. There must in every case be some point where the special knowledge not possessed by any particular doctor might have been useful, and we shall all endorse Sir Bertrand Dawson's plea for the development of "team-work" in medical practice. The need for adequate medical service has outstepped its provision not only for the masses but for the well-to-do, added Sir Bertrand Dawson, who prophesied that the unsuitability of the home for the treatment of the sick would soon become generally recognised when larger institutional organisation would follow as a sequel. Reconstruction of medical practice on these principles, with the general practitioner the central pillar of erection, implies that the general practitioner must have opportunities for observation, advanced education, and prosecution of research which he is now totally without, but, as the Cavendish lecturer acutely pointed out, he requires, if he is to get any advantage out of such improvement in his professional life, adequate repose and adequate

[1] THE LANCET, 1910, ii., 1289.

remuneration. The medical service which Sir Bertrand Dawson outlined would have the local hospitals and clinics as their centre, and the staff of the central hospital would provide the consultants and specialists for the local hospitals, and would be a whole-time or part-time service according to the nature of the work. He dwelt upon the complications of working such an organisation alongside of the National Insurance Act, whose administration of medical benefits is directed towards the treatment of disease rather than its prevention. In the sequel, a second part of the Cavendish lecture delivered on Thursday night, the lecturer supplied the arguments to show that the officiate of the Ministry of Health should be in its essential characters medical, and the profession at a critical time in its career will be grateful to him for an outspoken pronouncement.

ANTINEURITIC AND ANTISCORBUTIC FACTORS IN FOOD.

Two interesting papers on the obscure but important constituents of foods known respectively as antineuritic and antiscorbutic substances appear in the June number of the *Bio-Chemical Journal*. The first is by Mr. J. C. Drummond, which embodies a study of the water-soluble accessory growth-promoting substance and its influence upon the nutrition and nitrogen metabolism of the rat. In this research, carried out in the Cancer Hospital Research Institute, London, the author found that the only apparent deviation from normal health in rats fed upon an artificial diet deficient in the water-soluble accessory substance was the appearance of creatinuria accompanied by a slow wasting of the skeletal muscles. The food consumption of rats fed upon the deficient diet is low, being probably reduced to that amount sufficient to supply the calorific requirements of maintenance. An increased food consumption is brought about by the addition of flavouring agents such as meat extract to the diet, but it is interesting to add that unless this agent contains the water-soluble substance no growth results. This observation seems to supply a criterion as to the value of meat extracts in the dietary, and those deficient in the accessory substance might have to be ruled out as possessing any dietetic value. The addition to the inadequate diet of water-soluble substance causes a greatly increased food intake, immediately followed by growth, the amount of growth being, within certain limits, proportional to the amount of accessory substance added provided that the diet is adequate in other respects. The experiments bear evidence that the length of time an animal is able to maintain itself upon a diet deficient in the water-soluble substance without suffering a serious loss of body-weight is directly proportional to the age at which the restriction is imposed. During the research it was found that actively growing animal tissues (embryos, tumours) do not contain appreciable amounts of the "water-soluble B" and pituitary gland, thyroid, thymus, testicle, and ovarian tissues showed a deficiency in this substance. The results are of interest, although the cause of the fatal decline which inevitably follows a deficiency of the water-soluble substance has not been determined. It may be noted, however, that symptoms of nerve disorder preceded death in three cases. In the second paper Arthur Harden and Sylvester S. Zilva deal with the differential behaviour of the antineuritic and antiscorbutic factors towards adsorbents. This research was undertaken in the Biochemical Department of the Lister Institute. The authors have confirmed the fact that fuller's earth absorbs almost quantitatively the antineuritic factor out of autolysed yeast. Dialysed iron does the same thing, but neither fuller's earth nor dialysed iron affects appreciably the antiscorbutic potency of orange juice, so that in a fluid containing autolysed yeast and orange juice the antineuritic factor is removed, while the antiscorbutic activity remains unimpaired. These observations are of interest in showing that there is nothing in common, apparently, between these antineuritic and antiscorbutic substances respectively so far as regards their behaviour with adsorbents. It is early yet to lay down what physiological significance these observations possess.

INCIDENCE OF INFECTIOUS DISEASE IN 1917.

Sir Arthur Newsholme's report to the Local Government Board on the local incidence of notifiable infectious disease has recently been published, the present being the seventh of the series.

Notifications in England and Wales during 1917.—Only 7 cases of small-pox were reported in the year, the average number in the preceding six years being 139. Typhus fever was reported in 4 cases only, against an average of 30. Of scarlet fever 48,817 cases were notified, or fewer by 26,905 than in the preceding year. Of diphtheria 43,315 cases, or 8392 fewer; of enteric fever 4601 cases, or 963 fewer; and of puerperal fever 1345 cases, or 651 fewer. The only diseases known to have shown increased prevalence in 1917 were cerebro-spinal fever and pulmonary tuberculosis, the reported cases of the former having increased to 1465, against an average of 1123 in the previous four years, and the cases of the latter having numbered 73,654, or more by 1175 than those notified in 1916. But this number includes duplicate notifications. The cases of measles notified under the Order of 1915, by medical men or by persons in charge of patients, exceeded half a million, but in this total German measles is included. In addition to the foregoing there were notified in England and Wales 13,325 cases of erysipelas, 357 of poliomyelitis, 8 of plague, and 6716 of ophthalmia neonatorum.

Seasonal incidence.—With respect to the seasonal incidence of scarlet fever, diphtheria, enteric fever, cerebro-spinal fever, poliomyelitis, and measles particulars are given in a table—the actual average weekly attacks being shown at the foot of each column. The proportion of the notifications to this average is given for each week, any special seasonal excess of 30 per cent. being indicated by heavy type.

Cases of sickness among sailors and soldiers.—Under a recent Act local medical officers of health now receive notification of all cases of infectious disease arising in barracks, camps, &c., in the occupation of H.M. Forces. The number thus reported in 1917 include 1244 of scarlet fever, 1296 of diphtheria, 177 of enteric fever, 442 of erysipelas, 2 of small-pox, 1023 of cerebro-spinal fever, 2210 of pulmonary tuberculosis, and 122 of other forms of tuberculosis.

In proportion as it becomes possible to compare the behaviour of infection in a longer series of years the value of these reports will obviously increase.

THE TREATMENT OF SCIATICA BY LUMBAR ANÆSTHESIA.

THE strenuous life of troops in the trenches and the exceptional climatic conditions of damp and cold have been productive of a large number of severe and refractory cases of sciatica and allied conditions in the military hospitals in Italy. In addition to these rheumatic cases there have been many others due to the direct action—contusion or wound of the nerve, or indirect action—neuritis following septic wounds, of projectiles. A large number of such cases have come under the notice of Dr. Claudio Mancini[1] at the military hospital at Spezia, who has obtained very encouraging results from treatment by lumbar anæsthesia, which may be summarised as follows.

[1] La Riforma Medica, June 1st, 1918.

Attempts have been made in the past to act directly on the sciatic nerve by injecting its trunk with anæsthetic solutions, thus Lange practised perineural infiltration with physiological solution, with the addition of tropococaine and stovaine at a temperature of 37°-38° C. Jaboulay proposed the injection of anæsthetic solution into the retro-rectal space in front of the coccyx with the idea of acting on the sacral sympathetic, and Cathelin and Sicard with the same intention made the injection into the epidural space. This latter method, however, is not easy of execution in fat subjects, and its action is uncertain and limited. Dr. Mancini's method proposes to obviate these inconveniences and carry the anæsthetic into contact with the roots of the injured nerves and their medullary connexions by lumbar puncture. For some years he used the ordinary mixture of novocaine and stovaine, but he now uses the former alone in doses of 12-15 cg. in a 5 per cent. solution. The injection is made in the third or fourth intervertebral lumbar space, and the duration of the anæsthesia varies from three-quarters of an hour to two hours. Note that novocaine undergoes changes by prolonged boiling or in old solutions, so that it is preferable to prepare the solution at the moment of use by dissolving the requisite quantity of novocaine in distilled water, previously sterilised and cooled, in a sterile test-tube, bringing it to the boil two or three times and rapidly cooling under a tap.

In traumatic cases which are susceptible to the anæsthetic action there must necessarily be an absence of anatomical lesions, such as cicatrices, adhesions, and compression. A prominent fact, however, was that in cases where spastic paralysis existed only to a small extent a permanent disappearance of pain and spasm followed the treatment. On the other hand, where the pain was merely symptomatic, as in incipient tabes, tuberculous coxitis, or Pott's disease, lumbar anæsthesia failed entirely.

THE PRIMARY CAUSE OF SHOCK.

IN an article published under this title in the *Medical Record* for June 2nd Dr. Fenton B. Turck has summarised his extensive observations on surgical shock, and has put forward a novel theory as to its causation. The starting point of the author's theory is his belief that injured tissue at once begins to undergo self-digestion, leading to the production of toxic albumins which when absorbed are deadly poisons. He finds that the stomach, intestines, and liver are the organs most severely affected by these "shock poisons," and that the nervous system is not primarily involved in shock. The possibility of producing immunity against shock forms a natural development of this conception, and the author holds that a high degree of immunity can be induced by injecting into an animal repeated and increasing doses of the homologous autolysed tissue. In the course of his experimental study of shock, Dr. Turck found that the intravenous injection of peptones brought about a condition of shock similar to that following on severe wounds or mechanical injury to the tissues; the same condition was produced by the injection of autolysed muscular tissue. In one series of experiments Dr. Turck shut off a limb by elastic ligatures from the general circulation and then mechanically injured the muscles peripheral to the ligature, thereby "liberating and disintegrating cells" and permitting autolysis to occur. After a variable interval the elastic ligature was removed and the free autolysed cells and their products were allowed to enter the general circulation; this procedure promptly caused severe symptoms of shock. Shock also occurred if the autolysed muscle tissue was transplanted into another animal or if the extract of such tissue was injected into another animal. Dr. Turck's work on the possibility of producing in man immunity against wound shock is still in progress, and obviously many difficulties have to be got over before the conclusions are accepted.

TECHNICAL RE-EDUCATION IN ITALY.[1]

BY PROFESSOR ETTORE LEVI (FLORENCE),

MEMBER OF THE EXECUTIVE COMMITTEE OF THE ITALIAN NATIONAL COMMISSION FOR THE ASSISTANCE AND PROTECTION OF THE DISABLED.

A LAW for the protection and assistance of men disabled in the war was adopted by the Italian Parliament in March, 1917, and upon it is based the whole complex work of the after-care and social assistance of the disabled man, whether incapacitated by wounds or illness.

The execution of this great undertaking was entrusted to a new organisation, known as the National Commission for the Protection and Assistance of the Disabled, composed of Members of Parliament, administrators, specialists, and disabled soldiers themselves, presided over by Professor Durante, Senator.

Organisation of Treatment.

The amalgamation of existing civil and military organisations was brought about of necessity, by the experience of the first year of war. For this experience showed that re-education, as a general measure, was doomed to failure if it were not preceded by adequate moral and physical preparation of the disabled man from the initial stages of his incapacity, and followed by a wise and kindly supervision during the critical period of his return to normal surroundings. Ideally, this pre-re-education—that is to say, the moral preparation of the patient—should be initiated at the very moment when he first realises that he will remain hampered for life by his physical disabilities.

In order to realise such an ideal we have attempted in Italy to concentrate without delay all the seriously disabled in two surgical first receiving centres, where they may live in an atmosphere favourable to their preparation for an active future. For this reason every patient, from whatever sector of our extended front he may come, is immediately conveyed to Mantua for the Northern front and Bari for the Eastern front, where he is ensured efficient treatment and intelligent moral preparation.

In order to carry out such preparation from the start—in field hospitals and hospital trains—the National Commission undertook the distribution of a pamphlet designed to popularise the law relating to the disabled, explaining to the patient and to all who may attend him—doctors, nurses, chaplains, and so on—what are the rights to which he is entitled and all that these imply: medical and surgical attendance, free provision of artificial limbs, maintenance for six months in a school of re-education, the laws relating to pensions and legal medical attendance, social relief and the securing of employment. This pamphlet has served the purpose of explaining to many discharged disabled soldiers the rights and privileges which were not at first made adequately clear to them.

From the first receiving hospitals in Mantua and Bari, the patients are distributed among the first-grade concentration hospitals of Turin, Milan, Genoa, Bologna, Florence, Rome, and Naples, and thus brought without delay into the neighbourhood of their families and of their normal environment. Surgical treatment is completed under healthy and agreeable surroundings, and the moral preparation, already initiated, carried on by the personnel of the local School of Re-education. As soon as the patient is able to sit up in bed he is encouraged to attempt light occupations, such as bead-work, cardboard-work, and toy-making. Thus his passive mentality is transformed into an active mentality, and he begins to feel the hope of a renewed possibility of work and to appreciate its necessity.

When his wounds are nearly healed he passes to the local concentration hospital of the second grade, where his physical and orthopædic treatment is completed. Mutilated limbs are adapted to artificial members, and crippled limbs are functionally restored as far as possible. The patient is no longer confined to bed and is encouraged to attend the existing schools. Here the illiterates, unfortunately numerous in Italy, are taught to read and write; or, having already mastered the rudiments of education, they may bring their knowledge to some degree of perfection. Small workshops are provided for the light manual work suitable

[1] Abstract of a Paper read at the Inter-Allied Conference on the After-care of Disabled Men.

to the great mass of disabled men who come from agricultural districts; these deal with wicker-work and basketry, coopering, clog-making, and the like. By these means even patients who refuse to spend six months in the schools of re-education are enabled to return to their homes with some notion of exercising their normal occupations. During this period they are furnished with temporary artificial limbs.

Schools of Re-education.

Then follows the third and last period of treatment. The physical treatment of the patient completed, after a month's leave he passes on to the School of Re-education already existing in each one of the above-mentioned cities. Re-education is, unfortunately, not compulsory in Italy, but the law makes it compulsory for every indigent patient to stay at least 15 days in the schools of re-education. He is, accordingly, made to realise the possibilities open to him and does not risk refusing such benefits owing to an incomplete appreciation of them. The return of those who repent of their refusal is thus made easy. Only in the School of Re-education itself do the disabled men receive their permanent artificial limbs. These are supplied by the special laboratory attached to each school under the direction of an orthopædic surgeon. Many schools also furnish gratuitously the necessary implements for the exercise of the trades and handicrafts taught there. This system has the object of centralising and retaining every patient for the longest possible time in the schools of re-education.

These schools were established in Italy through local initiative, and for this reason neither their administration nor their programmes have been perfected or coördinated. They are now, however, under the control of the National Commission, which will reinforce and organise them according to a general and uniform design, as follows:—

1. The great mass of disabled agricultural workers will be given some elementary scholastic knowledge.
2. They will be taught at least one of the easier trades which may be followed in any part of the country, and are known therefore as subsidiary to agriculture.
3. The more informed and intelligent agricultural labourer will receive instead a general and technical instruction which shall advance him according to his former occupation, teaching him the more highly specialised methods of agriculture and of stock-breeding. Such a programme will tend to check the artificial movement toward the cities and the pernicious pursuit of Government employment.
4. Disabled men who prefer non-agricultural work will find in the same centres of re-education both primary and secondary schools and workshops where they may be trained in the trade most adapted to their education, with special reference to local industries.

We in Italy are convinced that the resident system is greatly superior to the non-resident, and we have, therefore, put the former into more extensive practice, yet without such rigid enforcement as to prevent men availing themselves of every practical local training scheme carried out upon a different basis. We are equally convinced that the larger institutions present material advantages over the smaller. Up to the present time, however, the smaller institutions have perforce been more prevalent with us, since, during the early days of private initiative in Italy the local bodies, though zealous, were little controlled and lacking in means. The National Commission, now reviewing the entire situation with impartial judgment, intends to give the maximum of assistance to the more flourishing institutions, and inexorably to condemn the weaker and less successful. The work of supervision and control is carried out by continuous inspections, entrusted to committees chosen from among the members of the National Commission, and composed for the most part of a specialist in re-education, an administrator, and a disabled officer or soldier.

In this regard it is worthy of note that there exists in Italy a flourishing Association of Disabled Soldiers, numbering already some 20,000 members, and acting in strict accord with the military authorities and with the National Commission. Representatives of this society are members of the Council of the National Commission and of every local committee. They have also the right to control the methods of re-education prevailing in the various centres. The National Commission exercises its complex work of control through the medium of the local committees, which during the first period of the war spontaneously undertook the establishment of schools of re-education. The local distribution of these institutions is, however, unfortunate, being numerous in the north and scarce in the south. To obviate this grave inconvenience the National Commission is undertaking, at its own expense, to found a large institution at Bari, and another in Sardinia, and is intending also greatly to extend the already existing institution at Naples.

Other Details of the Scheme.

The National Commission is actively engaged in the preparation of a new and complete census of the disabled men who have already returned to their homes. The Commission will thus be enabled to supply, with the least possible delay, what has been lacking in the past. For only by means of an exact report of the physical, re-educative, and social circumstances of each individual is it possible to bring under fresh supervision those disabled men whose condition is still capable of improvement, to complete and perfect the application of artificial limbs, to attract to the schools of re-education those who have not already profited by them, and to secure employment for those who have or have not been re-educated.

The Commission is also organising a Special Committee for the Study of Prosthesis, endowed with ample powers and an extended programme. This committee will study, both from a practical and scientific standpoint, the subject of artificial limbs in general, and of those adapted for industrial purposes in particular.

For the treatment and re-education of the blind the same general scheme will serve. From Mantua and Bari they are rapidly centralised in the ophthalmic first concentration hospitals of Milan, Rome, Florence, Naples, and Catania. The same general plan is followed for the permanently deaf-mute, who will be taught lip-reading in special institutes.

The disabled of every grade receive free maintenance in the schools of re-education for a period of six months, which may be extended in the case of those who show themselves deserving. The financial requirements of the National Commission are determined year by year by the Ministry of the Interior, acting in collaboration with the Council of the National Commission. The finances of the schools of re-education, previously supported by private funds, will be taken over by the Commission, as is necessary or desirable. The Commission undertakes also to administer gifts or legacies made to the disabled.

Lastly, the National Commission has also the task of extending its protection and assistance to all service men incapacitated through illness. This is a work of immense proportions and of essentially medical character, which, however, must not be separated from re-education. For no patient, until he be restored to favourable physical condition, is capable either of re-education or of social usefulness. Special study is being given by the Commission to the grave problem of the tuberculous cases, with the close coöperation of the military and civil sanitary authorities. It is intended that tuberculous patients shall be taught, in special tuberculosis sanatoria, that régime of life which they must follow if they hope to be cured. While actively forwarding such antitubercular pre-education the Commission expects to have among such patients a steadily increasing percentage who may become candidates for a future technical re-education, under a special supervision which must never lose sight of the pathological origin of their disability.

The financial and industrial future of all disabled men in Italy is facilitated by the fact that the foresight of the law has undertaken to insure them against industrial accidents, and will also advance to them, with the guarantee of their pensions, sufficient loans to make possible the building of farmhouses or the purchase of cultivable lands. The concession of such benefits is under the strict control of the National Commission, which will, however, give it the widest possible application, so that in time a large proportion of our disabled agricultural workers will become proprietors of small farms which they may cultivate by their own labour.

Those who desire fuller information upon the subjects treated in the foregoing report may refer either personally to Professor Ettore Levi, Piazza Savonarola 11, Florence, Italy; or to Opera Nazionale per la Protezione ed Assistenza degli Invalida di Guerra, Palazzo Taverna, Via Monte Giordano, Rome, Italy.

DRIED MILK FOR INFANTS.

THE Local Government Board has issued for wide circulation the following résumé[1] of Dr. F. J. H. Coutts's report on Dried Milks, with Special Reference to their Use in Infant Feeding. The conclusions of the report are based on an average of 26 samples of full cream dried milk examined at the Government Laboratory, and the report refers in several places to the previous food reports, No. 15 and No. 20, dealing respectively with condensed milks and proprietary foods for infant feeding.

Dried milk or milk powder is a substance prepared from cows' milk by the abstraction of almost the whole of the water so as to leave practically nothing but the solids of the milk. The product may contain varying amounts of milk fat, according as it is made from full cream milk or from milk partially or completely skimmed. Dried milk made from full cream milk contains 26·62 per cent. of fat, 24·46 per cent. of protein, 36·98 per cent. of milk sugar, 6·12 per cent. of mineral matter, and 4·32 per cent. of water.

There are several processes for preparing dried milk, but two methods are most commonly employed: (*a*) by passing liquid milk over metal cylinders heated internally by steam or hot water; and (*b*) by spraying milk, after partial condensation, into heated air. The chief object is to obtain milk in a solid condition with as little change as possible in the milk constituents.

Dried milk is a light yellowish-white powder which, when carefully prepared from good fresh milk, keeps for several weeks or months if it is kept dry. On mixing with warm water in the proportion of 1 part by weight of the dry powder to 7 parts by weight of water (approximately one large teaspoonful of the dried milk to two tablespoonfuls of water) a liquid is obtained corresponding in composition to ordinary milk, but usually having a slight boiled taste and a tendency for a little solid matter to settle and for fat to rise to the top.

Dried milk as put on sale in this country comes usually under one of four classes: (1) Full cream; (2) three-quarter cream; (3) half cream; and (4) skimmed. Full cream dried milk for baby feeding is sometimes sold merely under this description, but certain firms supply it under special names or brands.

It is most important to emphasise that babies should, wherever possible, be fed solely on their mothers' milk.

If this is impossible it is best to feed partly on the breast and partly on the bottle. No other food can really replace breast milk. If, however, an infant must be hand-fed, cows' milk in some form or other is the most satisfactory substitute usually available.

Dried milk for feeding of infants.—Experience during the last 12 or 14 years shows that dried milk is one of the most satisfactory forms of cows' milk for use in the feeding of infants. It has been very largely employed in connexion with infant welfare centres in England, particularly in Leicester and in Sheffield, and experience in these towns, and also in many other places, shows that a very large proportion of babies can take dried milk very well, and that on this food they thrive and develop in a satisfactory manner. It has been found that babies digest dried milk well. Vomiting is less frequent with dried milk than with ordinary cows' milk.

Fresh, clean, pure, raw cows' milk is a very good food for a baby when mothers' milk is not available, but unfortunately the milk ordinarily sold in towns does not conform to this description, being often far from clean and containing large numbers of germs. Such milk, especially in summer, will not keep a day without becoming sour and is apt to cause digestive troubles in babies. Dried milk contains far fewer germs than ordinary town milk, and is less likely to contain the germs of infectious diseases. Also germs do not multiply in dried milk; they do in ordinary milk. Dried milk keeps well so long as it is kept dry. Only as much should be made up at a time as is required for one feed, and there need, therefore, be no waste. Pasteurised, sterilised, or boiled cows' milk are useful foods if properly prepared, but they have some disadvantages as compared with dried milk. In particular, they do not keep well, especially in summer.

Unsweetened full cream condensed milk is also useful for baby feeding, but when mixed with water in the proportions sometimes recommended it is too weak for the satisfactory nourishment of the baby. *Sweetened* condensed milk is often used for baby feeding. Dried milk has the advantage, when made up with the proper proportion of water, of containing the essential food elements in a proportion more suitable for the baby than when full cream sweetened condensed milk is used. The latter, if made up so as to give the right proportion of fat, has a very excessive amount of sugar. This is not good for the baby, who usually becomes fat and flabby, and is liable to suffer from diseases such as rickets, &c. These same risks attach to other infant foods containing excess of sugar.

So-called "malted" milks have in recent years been recommended for baby feeding. These, like sweetened condensed milks, contain much too low a proportion of fat as compared with the amount of sugar. They differ from sweetened condensed milk in the nature of the sugar. In condensed milk this is mainly cane sugar, in malted milk it is largely malt sugar derived from the malted cereal used in its preparation. The ordinary patent infants' foods, containing large quantities of practically unaltered starch, are worse than sweetened condensed milk or malted milk. They are not fit for use for a baby under seven months of age.

In view of the above considerations it is not surprising that at official infant welfare clinics dried milk is becoming used to an increasing extent as on the whole the most convenient and most suitable food when babies cannot get breast milk. In feeding babies on dried milk the *full cream variety* should alone be used, unless on the advice of a doctor. Commencing with 1 teaspoonful of dried milk in 3 tablespoonfuls of water in the first or second weeks of life, it can be rapidly increased to 1½ to 2 teaspoonfuls of dried milk in 4 to 5 tablespoonfuls of water by the end of the second month, and so on to 5 teaspoonfuls of dried milk in 10 tablespoonfuls of water at the age of 5 or 6 months.

Fears were at one time expressed that the use of dried milk for babies might result in scurvy or rickets. Prolonged experience at infant welfare centres has indicated no ground for these fears; but as an extra precaution to avoid the possibility of scurvy, and particularly if the use of dried milk is to be continued for a long time, a little fruit juice, such as orange or grape juice, may be given to the baby one or twice a week.

Dried milk is also a valuable food for nursing mothers.

In a very large number of towns dried milk for baby feeding is supplied from infant welfare centres, at which advice is also given as to the method of preparing and using the food. Where any difficulty is experienced in obtaining supplies of dried milk for infant feeding information can be obtained by application to the medical officer of health.

We have already referred briefly[2] to the report on dried milk for infants in which Dr. Coutts concluded that, while the method of drying by spraying milk into hot dry air yielded a powder which "reconstituted" better than the powder obtained by the roller process, yet in infant feeding there appeared to be no dietetic difference of importance between the two products.

[1] Copies of the résumé can be obtained from the Stationery Office or through any bookseller, price 1*d*. each. Copies of the report *in extenso* can also be obtained, price 2*s*.

[2] THE LANCET, April 6th, 1918, p. 509.

THE BELGIAN DOCTORS' AND PHARMACISTS' RELIEF FUND.

SUBSCRIPTIONS TO THE SECOND APPEAL.

THE following subscriptions and donations to the Fund have been received during the week ending July 6th:—

	£	s.	d.
Mr. H. J. Price	5	0	0
Dr. Arthur Whitfield ...	10	0	0
Dr. John Marshall... ...	1	1	0
Dr. Jas. W. Russell ...	5	0	0
Dr. Peter H Abercrombie	5	5	0
Capt. J. Thomarson, R.A.M.C.	1	1	0
Dr. Judson Bury	3	3	0
Dr. A. Hugh Thompson	5	0	0
Dr. W. H. Davies (to be quarterly)	1	10	0
Dr. and Mrs. Major ...	2	2	0
Dr. J. W. Browne	1	1	0
Dr. C. H. Whiteford ...	2	2	0
Dr. T. P. Greenwood ...	0	5	0
Dr. W. Petrie Simpson	1	1	0
Dr. Arthur Court	1	1	0
Dr. S. M. Salaman... ...	1	0	0
Messrs. Balfour, Williamson and Co.*	10	0	0
Mr. Harry E. Walters†	5	5	0
Mr. T. B. F. Eminson ...	2	2	0
Major J. W. Hope, Australian M. Forces	1	1	0
Surg.-Gen. P. H. Benson, I.M.S. (retired)	1	1	0
Ccl. C. J. Jacomb-Hood, R.A.M.C. (T.)	1	1	0
Sir Herbert Roberts, M.P.‡	5	0	0
Mr. E. Spencer Evans (monthly)	0	10	0
Dr. Cameron Kidd	5	0	0
Dr. Alfred Cox (monthly)	1	1	0
Dr. Ernest Carter	2	0	0
Dr. E. B. Ffennell	1	1	0
Dr. Abraham Cohen ...	2	2	0
Dr. Robt. Hutchison ...	5	0	0
Mr. J. Herbert Parsons	5	5	0
Mr. J. H Bishop	1	1	0
Lord Egerton of Tatton	25	0	0
Dr. Geo. S. Middleton ...	5	5	0
Dr. W. H. Russell Fosbrook	2	2	0
Dr. Henry J. May	5	5	0
Prof. T. K. Monro	10	10	0
Dr. G. D. Thane	2	2	0
Mr. Wm. F. Rawson ...	1	1	0
Sir Wm. Osler	20	0	0
Dr. F. W. Penfold ...	5	0	0
Dr. David Riddell	10	0	0
Dr. J. Jordan Coleman	10	0	0
Dr. Austin O'Dowd ...	2	2	0
Dr. Prosser White ...	1	0	0
Mr. W. Minchin	2	2	0
Dr. J. R. R. Pollock ...	2	2	0
Dr. F. Muriel Morris ...	1	1	0
Messrs. Needhams, Ltd.	0	10	0
Dr Florence Theobalds	1	1	0

* Per Sir Rickman Godlee. † Per Sir StClair Thomson. ‡ Per Sir Thomas Barlow.

Subscriptions to the Fund should be sent to the treasurer of the Fund, Dr. H. A. Des Vœux, at 14, Buckingham Gate, London, S.W. 1, and should be made payable to the Belgian Doctors' and Pharmacists' Relief Fund, crossed Lloyds Bank, Limited.

Correspondence.

"Audi alteram partem."

JURIES AND WAR-TIME CHANGES.

To the Editor of THE LANCET.

SIR,—The annotation on this subject in your issue of June 29th is a timely one because of the necessity of upholding the standard of liberty in this country. The coroner's court is in constitution and practice entirely democratic, and it appears strange that at a time when Democracy (spelt with a very large D) is more and more obtaining power and influence in legislation it should be quite content to deliver up without a murmur its most ancient and honourable court. The removal of liberty from the citizens of this country is in the air, and the interference with the coroner's court is one of the many signs of what is in store for us.

I agree substantially with Dr. Waldo's reluctance to sit without a jury as coroner, and it appears to me that the only change which is in any way desirable is that the coroner should have the power to hold inquests without a jury when he thinks fit. There is no doubt that if any coroner seriously abused this discretion public opinion would very speedily correct him.

A recent decision in the High Court has made the legal position of proceedings in coroners' courts quite clear. The coroner's court is one of first instance, and its function is to determine how, when, and where a person has come to his or her death. It is work, therefore, principally concerned with medical evidence, and consequently legal knowledge is as unnecessary as common-sense and knowledge of disease or injuries are necessary. It has become the fashion to suppose that the passing of examinations for the position of barrister-at-law as well as a medical qualification are of importance for the holder of the coroner's office; there really is no ground for this fashion, the presumption being that a man who is a barrister-at-law and a registered medical practitioner has not been a success in either profession.

I am, Sir, yours faithfully,

Hatfield, July 1st, 1918. LOVELL DRAGE.

"SEXUAL PERVERSION."

To the Editor of THE LANCET.

SIR,—In your issue of June 22nd Dr. L. Weatherly writes of "Sexual Perversion," attributing it to several causes. Though I think all these are more or less open to criticism I will confine my remarks to that one only which he names "inherited perversion," for it plays the most prominent part among the five classes he enumerates, and the implications of this very indefinite term were made use of in the late libel action to which Dr. Weatherly refers.

Though Dr. Weatherly does not define what he means by "inherited perversion," or, indeed, by the word "perversion" itself, it may, I think, be assumed that he denotes by sexual perversion any manifestation of sexual excitement, desire for sexual contact, or actual sexual contact with a person of similar sex, or, in other words, homo-sexual tendencies in either sex. And when he attributes such tendencies to "inheritance," he probably regards them both as pathological, "inborn," and transmitted as such. There is, however, a large class of cases in early youth and adolescence in which, as is well known to many, if not most, medical men, such manifestations *exist*, but do not *persist* when rightly guided by experience and education in the widest sense of these words. That such cases are not uncommon is also known to many parents and teachers, and they are quite frequent in schools of all kinds. Dr. Weatherly, however, does not lay any stress on these youthful cases, though they far outnumber the adult cases to which he limits his comments. It is surely more correct to attribute these manifestations rather to a natural, unrecognised, undifferentiated, and unguided sexual instinct than to a naturally abnormal and necessarily perverted instinct. In a majority of such cases *right guidance* of these instincts, all too much neglected by those who have it in their power to give such guidance, would either prevent or readily correct such indulgences on the part of the young, who are really ignorant of the nature of the desires which move them. The young human must not only *learn* to walk and to speak, but he must also *learn* nearly all that concerns his conduct as a civilised human being. He has not so many instincts as many of the lower animals have, but he has very early to learn to control his promiscuous desire for food and his natural curiosity and his tendency to appropriate or destroy what is not his. His sexual instincts, developing later than these other instincts, nevertheless equally require guidance, but very often, perhaps most often, they are allowed to develop without any proper "direction," and thus he runs the risk of bearing the blame, or the disgrace, or the punishment which is meted out to those who transgress the social rules, whether wittingly or not, in this special sphere of conduct.

It is the young, not the adults, which matter most in any discussion of this subject. Misunderstanding here may lead, and has led, to disastrous results. In schools such misconduct is not, as a rule, warned against or prevented, but when a scandal is feared it is severely punished. But there is another evil possibility from the spread of the comprehensive doctrine of "inherited perversion," apart from its hypothetical nature. For it may lead to the provision of excuses to those who certainly cannot plead ignorance for conduct to which penal coercion may be more fitting.

I am, Sir, yours faithfully,

June 29th, 1918. H. BRYAN DONKIN.

METHODS OF GENERAL ANÆSTHESIA IN FACIAL SURGERY.

To the Editor of THE LANCET.

SIR,—I am glad that Captain T. Lovett has drawn attention in THE LANCET of June 22nd to the advantages of a preliminary opening of the air-tube in some of these cases, but I would point out that for such purposes laryngotomy is, as a rule, preferable to tracheotomy. As shown in articles by Dr. J. W. Bond and the late Sir Henry Butlin, by the former operation dangers of aspiration of blood from the wound and of opening up the deeper tissues are avoided—and it may be done very quickly and easily in the way therein described. If there is no need to keep the tube in after the operation the wound will speedily heal if the head is kept bent forward. It may be added that when chloroform is given from a Junker's tube held near the opening very little is needed, especially if care is taken to time the compressions of the ball to the inspirations.

I am, Sir, yours faithfully,

London, N.W., June 24th, 1918. J. D. MORTIMER.

To the Editor of THE LANCET.

SIR,—With reference to Captain T. Lovett's letter in THE LANCET of June 22nd, I should like to say that we have, in a few cases, employed preliminary laryngotomy, after induction of anæsthesia, as used by the late Sir Henry Butlin, consulting surgeon to St. Bartholomew's Hospital, and handed down through Mr. W. D. Harmer to Major Gillies, and I think that this method is preferable to tracheotomy. I quite agree that it is very useful when there is much oral sepsis, but we rarely employ it, and we have very few cases of pneumonia. This may be due to our healthy surroundings.

I am greatly indebted to Captain H. E. G. Boyle, R.A.M.C. (T.), for his kindness in demonstrating to me the technique of oil-ether administration, and also to Major Gillies, R.A.M.C., for his great patience and watchful help during operations.—I am, Sir, yours faithfully,

R. WADE, Captain, R.A.M.C.,

July 1st, 1918. Anæsthetist, The Queen's Hospital, Sidcup.

THE RISKS OF ALCOHOL INJECTION FOR TRIGEMINAL NEURALGIA.

To the Editor of THE LANCET.

SIR,—Professor Jonathan Hutchinson, in his lecture on the Operative Treatment of Trigeminal Neuralgia in to-day's issue of THE LANCET, mentions the eye complication only which may result from alcohol injection. I should like to record that I have seen two cases lately in which the middle ear has been badly and permanently disorganised owing apparently to the spirit entering the Eustachian tube.

I am, Sir, yours faithfully,

Savile-row, W., July 6th, 1918. ARTHUR H. CHEATLE.

SIMILAR TREATMENT FOR SIMILAR EMPLOY.

To the Editor of THE LANCET.

SIR,—The answer given by Mr. Forster to Sir Robert Newman in the House of Commons on July 2nd seems a little misleading. He said: "These women doctors serving for home duty only, on temporary engagement, are treated in the same way as civilian medical men similarly employed." Now, there are women doctors attached to military hospitals at home on a month's engagement who receive 24*s.* a day, as against £1 paid to the whole-time medical man. I know one of the latter, over military age, who has had 17 years' experience of X ray work, and during the first two years of the war was giving anæsthetics daily in a civil hospital. He was invited to take the post of combined anæsthetic and X ray specialist in a war hospital, and was offered £1 a day as a whole-time civilian. He took the appointment and, having agreed to that very moderate remuneration, did not consider it fitting to have a question on the subject asked in the House.

Many women doctors engaged by the War Office have only just qualified and have only a student's knowledge of practical work. Should they not therefore be content with earning 20 per cent. more than the civilian medical man of mature years who is giving patients the benefit of his long experience? I am, Sir, yours faithfully,

Keswick, July 7th, 1918. W. D. ANDERSON.

EPIDEMIC ENCEPHALITIS.

To the Editor of THE LANCET.

SIR,—May I ask for space to refer to one or two points raised by Dr. Kinnier Wilson's paper on this subject in your issue of to-day?

1. The organism found by von Wiesner in the Viennese cases is, I am told by high bacteriological authority, indistinguishable from Rosenow's diplococcus, which has been, during the last two years, so generally found associated with poliomyelitis in New York, and of which, it is believed, the Flexner bodies represent one stage. The same organism has been identified recently in London.

2. Dr. Breinl concludes, on the basis of experimental results, that the Australian disease and acute poliomyelitis represent the same affection.

3. Wickman and others have recorded epidemics of poliomyelitis in winter and spring.

4. Leslie Carr has drawn special attention to stupor, and Koplik to ophthalmoplegia, in the New York epidemic of 1916.

5. In America in 1916 it was generally found that the changes in the cerebro-spinal fluid stood in relation with the "type" of case dealt with.

6. Of the cases that I personally have seen in London recently, quite a large proportion (perhaps 30 per cent.) were "meningitic" in type in a series of over 120 that included seven of the "ordinary" spinal kind.

7. Variations in type—clinical, epidemiological, and in respect of age-incidence—are the *rule* and not the exception if a series of outbreaks and epidemics of poliomyelitis are considered.—I am, Sir, yours faithfully,

Harley-street, W., July 6th, 1918. F. G. CROOKSHANK.

INSURED PATIENTS AND EXPENSIVE DRUGS.

To the Editor of THE LANCET.

SIR,—The case of Mr. F. C. Fisher reported in THE LANCET of June 29th shows that the Insurance Commissioners interpret an obligation undertaken by themselves in a different spirit from that in which they interpret an obligation undertaken by others. They profess that the benefits reaped by insured persons include the supply of appliances, but a practical experience of the Act shows that "appliances" does not mean "all appliances." Trusses, elastic stockings, and nasal irrigators have to be paid for by the patients who need them. Then why is a promise to supply "drugs" taken to include "all drugs"? The defence would no doubt be that the funds will not allow of the supply of trusses, &c., which is quite in accordance with the astonishing principle which runs through the Insurance Act, of not making sure that the cloth and the coat to be cut out of it correspond. Precisely the same argument, with immensely greater force, applies to the individual doctor and the drugs which he supplies. I am, Sir, yours faithfully.

East Grinstead, July 3rd, 1918. F. C. POYNDER.

The War.

THE CASUALTY LIST.

THE following medical officers appear among the casualties announced since our last issue:—

Died.

Capt. R. N. Wallace, R.A.M.C., qualified at Edinburgh in 1907 and had held appointments at the Bradford Royal Infirmary, at the Manchester Children's Hospital, and at the Edinburgh Royal Infirmary. Prior to the war he held a commission in the R.A.M.C.(T.F.), being attached to the 6th Battalion, Royal Scots, and gave up an active practice at Edinburgh to devote himself to military duties in connexion with the war. He died at Colchester Military Hospital from acute pneumonia.

Lieut.-Col. W. McCall, D.S.O., R.A.M.C., was educated at Anderson College and at the University, Glasgow, and qualified in 1892. He was in practice in Birmingham, and prior to the war was attached to the R.A.M.C. (T.F.), being in command of the 1st South Midland Ambulance. The award of the D.S.O. was recorded in THE LANCET of Jan. 12th this year, p. 78.

Capt. P. J. Monaghan, South African M.C., qualified M.R.C.S. Eng. and L.R.C.P. Lond. in 1911, and later went to South Africa, from whence he came over with the South African Contingent in the early days of the war.

Capt. J. Anderson, R.A.M.C.

Lieut. L. F. Jamieson, R.A.M.C.

Wounded.

Capt. E. S. Cuthbert, R.A.M.C.

Major G. G. Timpson, R.A.M.C., attached R.F.A.

Previously reported Missing, now reported Not Missing.

Capt. J. P. McVey, R.A.M.C., attached Norfolk Regt.

Previously reported Missing, now reported Prisoners in German Hands.

Capt. G. L. Jones, R.A.M.C., attached Scottish Rifles.
Capt. R. M. Coalbank, R.A.M.C., attached Lancs Fusiliers.
Capt. C. W. Fowler, M.C., R.A.M.C., attached R. Berks Regt.
Capt. P. H. Green, R.A.M.C.
Capt. H. S. Moore, R.A.M.C., attached Lincs Regiment.
Capt. A. G. Clark, M.C., R.A.M.C., attached S. Lancs Regt.

CASUALTIES AMONG THE SONS OF MEDICAL MEN.

The following additional casualties among the sons of medical men are reported:—

Major C. F. Clarke, Indian Cavalry, died of illness contracted on active service, only child of the late Dr. J. F. Clarke, of Mitcham, Surrey.

Lieut. E. C. Rennie, R.G.A., attached R.A.F., died of wounds, son of Dr. G. E. Rennie, of Point Piper, Sydney, N.S.W.

Second Lieut. W. W. Pollard, R.A.F., died in hospital, only son of Dr. W. H. Pollard, of Birmingham.

THE HONOURS LIST.

The following are the statements of service for which the decorations recorded in THE LANCET of Feb. 9th, 1918, p. 234, were conferred. All are members of the R.A.M.C. except where otherwise stated:—

Bar to the Distinguished Service Order.

Maj. (temp. Lieut.-Col.) ARTHUR CARR OSBURN, D.S.O.—For conspicuous gallantry and devotion to duty. On seeing the enemy approaching close to his dressing station, he carried out the evacuation of the wounded under heavy shell and rifle fire in the coolest and most gallant manner. Having cleared away all cases by ambulance train and cars, he re-established his dressing station further in rear. As officer commanding bearer divisions he constantly inspected his line of bearer-posts and forward dressing stations under heavy fire. The successful evacuation of the wounded from the divisional front was due to his careful organisation and fearless supervision under the most trying conditions. His was an example of gallantry, courage, and resource worthy of the highest praise.

Distinguished Service Order.

Temp. Capt. FERGUSON FITTON CARR-HARRIS.—For conspicuous gallantry and devotion to duty. Hearing that ten men of another battalion were lying wounded in front of the position, he volunteered on completion of the relief to go to their rescue. He was out for eight hours of the night, found nine of the men alive, took two of them back to headquarters, and organised the rescue of the remainder. He showed great coolness and self-sacrifice.

Major (temp. Lieut.-Col.) CHARLES ALGERNON STIDSTON.—For conspicuous gallantry and devotion to duty when his dressing station was very heavily shelled throughout a whole day and received several direct hits. It was impossible to remove the wounded, and throughout the day he moved about continuously, arranging for their safety, with utter disregard of danger. It was owing to his fearless example and splendid organisation that all the wounded were finally removed without further casualties.

Bar to the Military Cross.

Capt. CUTHBERT DELAVAL SHAFTO AGASSIZ, M.C.—For conspicuous gallantry and devotion to duty when in charge of a bearer-post. He remained working throughout an intense bombardment, in which some of his bearers were killed and wounded while loading ambulance cars. He was compelled to remove to dug-outs, and there persisted in his work until shelled out. Though driven back three times by machine-gun fire and gas shell barrages, he succeeded in reaching the aid-posts with his bearers, and removed all the wounded.

Temp. Capt. ARTHUR JOSEPH BLAKE, M.C.—For conspicuous gallantry and devotion to duty. He did splendid work in collecting and evacuating the wounded, working throughout in the open regardless of the heavy hostile fire. Later he did excellent work tending the wounded of several units, going out after dusk to bring in wounded men from in front of our line. During the withdrawal he took out a party and carried back seven stretcher cases for a distance of three miles, thereby preventing these men from falling into enemy hands. He has at all times carried out his duties with fearlessness and courage.

Capt. ERIC ALFRED CHARLES FAZAN, M.C.—For conspicuous gallantry and devotion to duty. During very heavy fighting his aid-post twice passed into the hands of the enemy. Although all communication with him by day was cut off for two days, he remained with his wounded, 235 of whom passed through his hands. It was due to his determination that every wounded man and all the personnel of his aid-post were safely removed.

Temp. Capt. JAMES WALLACE MACFARLANE, M.C.—For conspicuous gallantry and devotion to duty. During a heavy bombardment of a battery position he assisted another officer and a sergeant in putting out the flames in a gun-pit which had caught fire. By his prompt assistance the gun was saved from serious damage and the ammunition from destruction.

Capt. SAMUEL McCAUSLAND, M.C.—For conspicuous gallantry and devotion to duty. He was in charge of bearers evacuating the wounded at a village under heavy shell and machine-gun fire. When almost the whole village was in the hands of the enemy he continued to supervise the collection of wounded, and it was mainly due to him and his bearers that they were all so speedily removed. In an attack he performed splendid work by clearing wounded of his brigade under most difficult conditions.

Capt. JOSEPH STEPHEN WALLACE, M.C.—For conspicuous gallantry and devotion to duty. Whilst in charge of an advanced dressing station and bearer squads he frequently visited the regimental aid-posts in the line and skilfully arranged his bearer squads to the best advantage. He also personally conducted ambulance cars to very advanced positions, thus being able to get a very large number of cases removed to safety in a short time. His coolness and courage during the whole period were a splendid example to his men.

The Military Cross.

Capt. ROBERT VACY CLIFFORD ASH.—For conspicuous gallantry and devotion to duty. When the enemy attacked and almost surrounded his dressing station he remained at his post under intense machine-gun and shell fire, attending to the wounded with complete disregard of danger. He got all the wounded safely away, and was instrumental in saving the transport and a large part of the personnel of the field ambulance. He then volunteered to return at once to the firing line, where he did excellent work in a most exposed position. He set a magnificent example of courage and devotion to duty.

Capt. ARTHUR JOSEPH BEVERIDGE, Spec. Res.—For conspicuous gallantry and devotion to duty. His dressing station was heavily shelled during an engagement, but owing to his determination, courage, and initiative a large number of wounded were attended to and evacuated from the danger zone.

Capt. JOHN HOLLIDAY BLACKBURN.—For conspicuous gallantry and devotion to duty. When 80 stretcher cases as well as a number of walking cases were handed over by another division, and owing to heavy shelling it was impossible to move them during the day, he took forward an ambulance as close up to the position as possible and organised the evacuation of the wounded. He showed splendid determination and resource.

Temp. Capt. JOSEPH VICTOR COPE.—For conspicuous gallantry and devotion to duty. He was in charge of stretcher-bearers in an exposed position, which was subjected to intense fire. Though he was suffering from gas he remained at his post for two days, setting such a magnificent example to his men that the evacuation of the wounded went on throughout the bombardment. By his courage and devotion to duty he saved many lives.

Temp. Capt. DAVID McMURRAY DICKSON.—For conspicuous gallantry and devotion to duty in tending the wounded under heavy shell and machine-gun fire. He was continuously out during the day searching the battlefield for wounded. He showed courage of a high order on this and many other occasions.

Capt. (temp. Major) JOHN DOUGLAS FIDDES.—For conspicuous gallantry and devotion to duty in continuing to dress the wounded under heavy shell fire at the advanced dressing station. Although the dressing station received a direct hit, he continued to work, and saved many lives by his courage and untiring energy.

Capt. JOHN HENRY PEARSON FRASER.—For conspicuous gallantry and devotion to duty in organising a new line of evacuation when the original line was blocked by the initial success of an enemy counter-attack. Many wounded had collected, but he got away over 100 stretcher cases, working unceasingly in the open for 36 hours.

Capt. PHILIP JACOB GAFFIKIN, Spec. Res.—For conspicuous gallantry and devotion to duty while in charge of stretcher-bearers during an engagement. He directed the removal of the wounded under heavy shell fire and showed great courage and resource.

Temp. Capt. HUGH BERNARD GERMAN.—For conspicuous gallantry and devotion to duty. When his dressing station was heavily shelled he organised the removal of 38 stretcher cases. He also rescued several wounded of another division under heavy shell fire. He established dressing stations without delay at various stages in an advance of four or five miles, and so enabled the wounded to be rapidly evacuated.

Temp. Capt. FRANK ARTHUR GRANGE.—For conspicuous gallantry and devotion to duty. He worked night and day without any rest attending to wounded from all units under continuous shell fire. He also went up to the front line under heavy fire to attend to a severely wounded man, and succeeded in getting him away.

Temp. Capt. EDWIN ALLAN THOMAS GREEN.—For conspicuous gallantry and devotion to duty. He worked with ceaseless energy, attending and evacuating the wounded. He moved his aid-post forward and worked under heavy shell fire till the enemy were within a few yards of his aid-post. He evacuated all the wounded save a few bad cases who could not be moved. His courage and presence of mind saved a large number of wounded from falling into enemy hands.

Temp. Lieut. ARTHUR COLLIS HALLOWES.—For conspicuous gallantry and devotion to duty when in charge of bearers. He succeeded in rapidly evacuating all the wounded under very difficult conditions. He attended to a severely wounded officer under machine-gun fire.

Temp. Capt. JAMES PHILLIPS JONES.—For conspicuous gallantry and devotion to duty. He worked in the line for a fortnight organising advanced dressing stations and bearer systems. During an enemy attack he was cut off from battalion headquarters, but established an aid-post and worked under heavy fire in the open for 36 hours attending to a large number of wounded. He showed the greatest courage and endurance throughout.

Temp. Capt. FREDERICK BENNETT JULIAN.—For conspicuous gallantry and devotion to duty. He remained at his post attending to the wounded during an engagement with great courage and determination though suffering severely from the effects of gas.

Temp. Capt. ARTHUR GRIFFITH MAITLAND-JONES.—For conspicuous gallantry and devotion to duty. During the operations he repeatedly reconnoitred the roads under heavy shell fire. By his example and leading he established communication with the most forward dressing stations, and succeeded in bringing up his ambulances and rapidly evacuating the wounded from very exposed positions.

Lieut. (temp. Capt.) WILLIAM WYLLIE MacNAUGHT.—For conspicuous gallantry and devotion to duty. He organised a bearer party during an action, and collected and cleared many wounded under heavy shell fire. His prompt and gallant action saved many lives.

Temp. Capt. JAMES MANUEL.—For conspicuous gallantry and devotion to duty. During an enemy attack he showed the greatest courage in attending to wounded men who were lying in shell holes exposed to enfilade machine-gun fire. With complete disregard of his own safety he went from one shell hole to another attending to the wounded, and continued at this work after he had been wounded himself.

Lieut. JOHN MARSHALL, Spec. Res.—For conspicuous gallantry and devotion to duty. When in charge of stretcher squads he succeeded in evacuating all the wounded during a critical period of a withdrawal from a village, frequently going forward beyond the firing line in order to accomplish his task.

Temp. Capt. DUNCAN JOHN McAFEE.—For conspicuous gallantry and devotion to duty. When two attempts to remove a wounded man from a regimental aid-post had failed owing to the stretcher-bearers being killed, he at once led forward a third party and succeeded in getting all the wounded back to a place of safety under very heavy shell fire. He showed splendid courage and self-sacrifice.

Temp. Capt. FREDERICK BUICK McCARTER.—For conspicuous gallantry and devotion to duty. When after an attack there were heavy casualties, he continued to attend the wounded in an open road enfiladed by machine-gun fire, and undoubtedly saved many lives.

Temp. Capt. JAMES ALLEN MONTGOMERY.—For conspicuous gallantry and devotion to duty. On his own initiative he organised a line of stretcher-bearers to search "No Man's Land." He personally took charge of the party and was often under fire and within a few feet of the enemy.

Capt. GEORGE MORRIS, Spec. Res.—For conspicuous gallantry and devotion to duty. He moved his aid-post forward and worked there ceaselessly day and night until the battalion was relieved. The aid-post three times sustained a direct hit from an enemy shell, but he immediately found another aid-post and continued to dress the wounded under continual shell fire.

Temp. Lieut. DAVID ASSUR HENRY MOSES.—For conspicuous gallantry and devotion to duty in working continuously at his aid-post during three days' operations under heavy shelling. Frequently shells dropped close by, killing and wounding several men, but he remained at work and showed the utmost indifference to danger.

Temp. Lieut. EVAN EDWARD OWENS.—For conspicuous gallantry and devotion to duty. He carried on his work in a crowded aid-post under continual shell fire with the greatest coolness and determination. Though blinded by gas, he continued for four hours to supervise the treatment of stretcher cases.

Capt. HAROLD DOBSON PICKLES.—For conspicuous gallantry and devotion to duty when in charge of bearers. When a number of wounded were lying in a cellar and the adjoining building, in which a number of "P" bombs and S.A.A. were stored, was set on fire he at once went to extinguish it and remove the ammunition. While doing so he, a N.C.O., and a man were wounded, but he got them both under cover. An hour later a second fire occurred, and he again went out to extinguish it. For three days he worked without rest superintending the evacuation of the wounded.

Capt. JOHN ALEXANDER PRIDHAM, Spec. Res.—For conspicuous gallantry and devotion to duty. He was in charge of an advanced dressing station where there were a large number of wounded when the enemy attacked. The task of removing the wounded was an extremely difficult one owing to the proximity of the enemy and heavy shell and machine-gun fire, but he carried it out successfully, remaining on the spot until all the wounded had been evacuated. By his courage and devotion to duty he was the means of saving many lives.

Capt. WILLIAM ROBERTSON.—For conspicuous gallantry and devotion to duty in attending to the wounded in the open during an attack when the battalion was held up by heavy machine-gun and rifle fire, and several casualties occurred. When two companies were cut off by heavy machine-gun fire and sustained casualties he volunteered to try and reach them. His conduct throughout was most courageous.

Temp. Capt. LIONEL MATTHEW ROWLETTE, D.S.O.—For conspicuous gallantry and devotion to duty. He worked untiringly attending to the wounded under very heavy fire throughout the whole day, and set a magnificent example of courage and coolness to all.

Temp. Capt. CEDRIC RUSSELL.—For conspicuous gallantry and devotion to duty. He worked in the open attending to the wounded during an engagement with complete disregard of danger under heavy fire.

Temp. Capt. ROBERT RUTHERFORD.—For conspicuous gallantry and devotion to duty. He worked continuously day and night at his aid-post under continual shell fire. When the aid-post had twice sustained direct hits and he himself was suffering from severe concussion, he established a new post and remained at work under heavy fire.

Temp. Capt. BRIAN HERBERT SWIFT.—For conspicuous gallantry and devotion to duty. When the front line was driven back close to the battery positions he moved about throughout the day from one battery to another, wherever his services were needed, with utter disregard of danger under heavy fire. He remained on the spot until the batteries had withdrawn, and was the last to leave the position. He set a splendid example of courage and determination.

Capt. ARTHUR PEREGRINE THOMSON.—For conspicuous gallantry and devotion to duty. He worked untiringly and with utter disregard of danger, attending to the wounded under heavy fire for several days during an engagement. It was entirely due to his efforts and example that a large number of wounded were safely evacuated.

Temp. Capt. GEORGE DIBBS KING WALDRON.—For conspicuous gallantry and devotion to duty when in charge of a party of bearers. Though several times blown over by bursting shells, he succeeded in evacuating all the wounded of the brigade. On one occasion he assisted to carry a stretcher case through a heavy barrage. He continued to work till utterly exhausted.

Capt. DOUGLAS LARMER WALL.—For conspicuous gallantry and devotion to duty. He attended the wounded under heavy shell fire in most exposed positions. He showed great courage and determination.

Capt. JAMES ANDERSON YOUNG.—For conspicuous gallantry and devotion to duty. When the building in which a number of wounded were lying was heavily shelled, with the assistance of another man he succeeded in carrying all the wounded into a cellar, though shells were continually bursting in the building. He showed the greatest courage and determination.

Capt. JAMES CARRUTHERS YOUNG, Spec. Res.—For conspicuous gallantry and devotion to duty when in charge of an advanced dressing station. When the village was continuously shelled he personally superintended the removal of many of the wounded to a safer position. During the night he had them all evacuated and established a new dressing station.

Capt. EDGAR DOUGLAS, Canadian A.M.C.—For conspicuous gallantry and devotion to duty. He directed his relay of bearers under heavy shell fire, and, though wounded, remained at duty until he was relieved.

Capt. AUSTIN DWIGHT IRVINE, Canadian A.M.C.—For conspicuous gallantry and devotion to duty. During four days in the front line he worked day and night attending to the wounded, often under heavy shelling. When casualties occurred during an enemy barrage, without hesitation he left battalion headquarters and went to the assistance of the wounded.

Capt. GORDON LEIGH JEPSON, Canadian A.M.C.—For conspicuous gallantry and devotion to duty. He established an aid-post during an attack under heavy shell fire, and for over ten hours attended to the wounded in the open under enemy shelling. When the enemy shelled his position with gas shells, and a number of stretcher cases were lying outside the aid-post, he went out at great personal risk and put box respirators on all the wounded, and by his prompt action saved many lives. He showed the greatest courage and self-sacrifice.

Capt. JAMES GRANT MACNEILL, Canadian A.M.C.—For conspicuous gallantry and devotion to duty. He worked unceasingly in the open attending to the wounded under heavy shell fire. During a gas-shell bombardment he adjusted his own box respirator on a wounded sergeant and obtained others for a number of stretcher cases who were unable to help themselves. His coolness and courage were a splendid example to all and undoubtedly saved many lives.

Capt. WESLEY HERBERT SECORD, Canadian A.M.C.—For conspicuous gallantry and devotion to duty when in charge of the evacuation of the wounded from the forward area. During a heavy bombardment of gas and other shells he made a tour of all the bearer-posts to ensure that all anti-gas measures were being employed. He attended to wounded men in the open during the bombardment with complete disregard of danger. His coolness and courage were a splendid example to all.

Capt. WILLIAM EWING SINCLAIR, Canadian A.M.C.—For conspicuous gallantry and devotion to duty. When in charge of bearers at the regimental aid-post he worked for three days and nights attending to the wounded under heavy fire and in the face of great difficulties. Though suffering severely from the effects of gas he remained at duty and set a magnificent example of courage and coolness to all.

Capt. REX CARRINGTON BREWSTER, New Zealand M.C.—For conspicuous gallantry and devotion to duty during an action. Throughout the day he was continually exposed to heavy shell fire while attending to the wounded, and set a splendid example to all ranks by his devotion to duty and contempt of danger.

Lieut. S. DUTT, I.M.S.—For conspicuous gallantry and devotion to duty. He worked indefatigably and attended a large number of wounded belonging to various units at the aid-post, which was under heavy shell, machine-gun, and rifle fire. His absolute coolness and steady devotion to duty were a splendid example to all.

The following medical officers have been brought to the notice of the Secretary of State for War for valuable services rendered in connexion with the war:—

Capt. (temp. Hon. Lt.-Col.) D. J. Armour, R.A.M.C.; Col. W. H. Horrocks, A.M.S.; Lt.-Col. F. S. Irvine, D.S.O., R.A.M.C.; Col. (temp. Maj.-Gen.) G. B. Stanistreet, C.M.G., A.M.S.; Temp. Col. A. S. Woodwark, A.M.S.; Col. G. E. Armstrong, Canadian A.M.C.; Hon. Lt.-Col. G. W. Badgerow, Canadian A.M.C.; Col. A. Primrose, Canadian A.M.C.; Lt.-Col. C. H. Tewsley, New Zealand M.C.; Maj. C. Macpherson, Newfoundland Contingent.

Captain Manley Angell James, M.C. (Gloucester Regiment), son of J. Angell James, L.R.C.P., M.R.C.S., of Nevil-road, Bristol, has been awarded the Victoria Cross.

OBITUARY OF THE WAR.

JAMES TENNANT WHITWORTH BOYD, M.D., C.M. ONTARIO,

CAPTAIN, CANADIAN ARMY MEDICAL CORPS.

Captain J. T. W. Boyd, who died at the Kitchener Military Hospital, Brighton, on June 16th, was 27 years of age, and son of the Rev. Andrew Boyd, of Port Arthur, Ontario. He obtained his medical qualification at Queen's University Medical School, Kingston, in 1914, and after spending a year at the Kingston General Hospital he enlisted in the C.A.M.C. and came overseas in February, 1916, when he was drafted to a Canadian General Hospital (Queen's University Unit) at Étaples. There he worked for a year in the laboratory until the results of a chronic scarlatinal nephritis necessitated his return to England, when he joined the staff of the Kitchener Hospital. In spite of the severe handicap of high blood pressure his work in the laboratory was consistently of the highest order, being characterised by a precise technique and an intellectual honesty which would have brought him to the fore had he lived. His death was due to uræmia. The photograph which we are able to give of Captain Boyd has been taken from a snapshot of a group.

PHILIP BEAUCHAMP SEWELL, M.D. MELB.,

CAPTAIN, AUSTRALIAN ARMY MEDICAL CORPS.

Captain P. B. Sewell, who was recently killed in action in France, was a student at Melbourne University (1911-16), obtaining his qualifying degree at a special War Final held in the latter part of 1916. He enlisted immediately, and for a short time was at a base hospital prior to embarkation. He was attached for a while as M.O. in a command depôt in England, and in August of last year went to France, where he was attached in succession to a field ambulance and an infantry battalion. During a counter attack on the night of April 24th-25th he was hit by a machine-gun bullet. His chief writes of Captain Sewell: "Throughout the winter he did most efficient work in watching over the good health of the battalion, and in all operations he proved himself a gallant, cheerful, and capable officer, and was a good comrade and well liked by both officers and men."

DEATHS OF WEST OF ENGLAND MEDICAL MEN.—Mr. Gillman Churton Pring Pauli, L.R.C.P. Edin., M.R.C.S., died at his residence, Redland, Bristol, on June 25th, in his seventy-ninth year. He was the son of the late Rev. C. H. Pauli, professor of ancient languages at Oxford University. Mr. Pauli was formerly in practice at Bedminster, Bristol, but recently had devoted himself solely to the duties of visiting surgeon to the Bristol City hospitals, with which he had been connected for 44 years. Mr. Pauli had a sound knowledge of infectious diseases. He was very popular and will be much missed in Bristol.—Mr. Vernon H. Starr, M.B., B.S. Lond., formerly house surgeon to the Royal Devon and Exeter Hospital, who was appointed in charge of the Peshawar Mission, N.W.F.P., India, in connexion with the Church Missionary Society, was murdered on March 17th. Dr. Starr was greatly respected in Exeter, and much sympathy is felt there for Mrs. Starr, who was with him at the time of the tragedy.—Surgeon Edwin John Gostwyck Sargent, L.M.S.S.A., R.N., died on June 25th at Bombay from the effects of sunstroke, in his twenty-sixth year. He was the son of Mr. W. G. Sargent, L.M.S.S.A., J.P., of Padstow, and grandson of the late Dr. H. E. Sargent, of Launceston. The deceased received his medical education at St. Bartholomew's Hospital, qualified L.M.S.S.A. in 1917, and entered the Royal Navy as a surgeon. He was highly esteemed at Padstow, and much sympathy is felt there for his relatives.

THE LANCET, VOL. I., 1918: THE INDEX.

THE Index and Title-page to the volume of THE LANCET completed with the issue of June 29th is in preparation. Owing to the increasing shortage in the paper-supply, the Index will not be issued with all copies of THE LANCET, as was the custom prior to the War. Subscribers who bind up their numbers are requested to send a *post-card* (which is more convenient for filing purposes than a letter) to the Manager, THE LANCET Office, 423, Strand, London, W.C. 2, when a copy of the Index and Title-page will be supplied free of charge.

URBAN VITAL STATISTICS.

VITAL STATISTICS OF LONDON DURING JUNE, 1918.

IN the accompanying table will be found summarised complete statistics relating to sickness and mortality in the City of London and in each of the metropolitan boroughs. With regard to the notified cases of infectious disease it appears that the number of persons reported to be suffering from one or other of the ten diseases specified in the table was equal to an annual rate of 4·5 per 1000 of the population, estimated at 4,026,901 persons; in the three preceding months the rates had been 4·9, 3·9, and 4·1 per 1000. The lowest rates in June were recorded in Kensington, Fulham, Chelsea, the City of Westminster, Holborn, and the City of London; and the highest rates in Finsbury, Bethnal Green, Southwark, Bermondsey, Deptford, and Greenwich. No fresh case of small-pox was notified during the month; the 3 cases under treatment in the Metropolitan Asylums Hospitals at the end of May were discharged during the month of June. The prevalence of scarlet fever was about 20 per cent. more than in the preceding month; this disease was proportionally most prevalent in Finsbury, Southwark, Bermondsey, Wandsworth, Greenwich, and Woolwich. The Metropolitan Asylums Hospitals contained 846 scarlet fever patients at the end of the month, against 931, 898, and 786 at the end of the three preceding months; the weekly admissions averaged 127, against 132, 105, and 129 in the three preceding months. The prevalence of diphtheria was about equal to that in the preceding month; the greatest proportional prevalence of this disease was recorded in Stoke Newington, Bethnal Green, Stepney, Southwark, Bermondsey, and Lewisham. The number of diphtheria patients under treatment in the Metropolitan Asylums Hospitals, which had been 1529, 1358, and 1232, numbered 1179 at the end of June; the weekly admissions averaged 165, against 182, 143, and 202 in the three preceding months. The prevalence of enteric fever was slightly more than in the preceding month; of the 41 cases notified in June, 9 belonged to Wandsworth, 5 to Hackney, 3 to the City of Westminster, 3 to Islington, and 3 to Battersea. There were 40 cases of enteric fever under treatment in the Metropolitan Asylums Hospitals at the end of the month, against 23, 23, and 32 at the end of the three preceding months; the weekly admissions averaged 6, against 3, 3, and 5 in the three preceding months. Erysipelas was proportionally most prevalent in St. Marylebone, St. Pancras, Shoreditch, Bethnal Green, Deptford, and Greenwich. The 18 cases of puerperal fever included 2 each in Fulham, Southwark, Lambeth, Wandsworth, and Woolwich. Of the 13 cases of cerebro-spinal meningitis 3 belonged to Stepney and 3 to Lambeth; while of the 9 cases of poliomyelitis 3 belonged to Bermondsey and 2 to Woolwich.

The mortality statistics in the table relate to the deaths of persons actually belonging to the several boroughs, the deaths occurring in institutions having been distributed among the boroughs in which the deceased persons had previously resided. During the four weeks ended June 29th the deaths of 3655 London residents were registered, equal to an annual rate of 11·8 per 1000; in the three preceding months the rates had been 18·1, 17·1, and 13·7 per 1000. The death-rates ranged in June from 8·8 in Wandsworth, 9·1 in Woolwich, 9·3 in Lewisham, 9·5 in Paddington, 9·6 in Stoke Newington, and 9·6 in Battersea, to 13·4 in St. Pancras, 13·6 in Chelsea, 13·7 in Bethnal Green, 13·9 in Greenwich, 14·7 in St. Marylebone, 15·8 in Southwark, and 15·9 in Finsbury. The 3655 deaths from all causes included 336 which were referred to the principal infectious diseases; of these, 151 resulted from measles, 5 from scarlet fever, 45 from diphtheria, 98 from whooping-cough, 9 from enteric fever, and 28 from diarrhœa and enteritis among children under 2 years of age. Among the metropolitan boroughs the lowest death-rates from these diseases were recorded in Paddington, the City of Westminster, Hampstead, Shoreditch, and Wandsworth; and the highest in Fulham, the City of London, Southwark, Bermondsey, Battersea, and Greenwich. The 151 deaths from measles were 30 above the average number in the corresponding period of the five preceding years; this disease was proportionally most fatal in Bethnal Green, Southwark, Bermondsey, Battersea, and Camberwell. The 5 fatal cases of scarlet fever were 9 below the average number. The 45 deaths from diphtheria exceeded the average number by 7, and included 5 in Stepney, 4 in Lambeth, 4 in Camberwell, 3 in St. Pancras, and 3 in Bermondsey. The mortality from whooping-cough was lower than in any of the preceding six months, the deaths numbering 98 against an average of 66; this disease was proportionally most fatal in Fulham, Islington, Finsbury, the City of London, Southwark, Deptford, and Lewisham. The 9 deaths from enteric fever agreed with the average; 2 belonged to Stepney. The 28 fatal cases of diarrhœa and enteritis among children under 2 years of age showed a decline of 40 from the average; 4 deaths belonged to Woolwich, 3 to Hammersmith, 3 to Greenwich, 2 to St. Marylebone, 2 to Islington, and 2 to Poplar. In conclusion, it may be stated that the aggregate mortality in London in June from these principal infectious diseases was 6 per cent. above the average.

ANALYSIS OF SICKNESS AND MORTALITY STATISTICS IN LONDON DURING JUNE, 1918.

(*Specially compiled for* THE LANCET.)

CITIES AND BOROUGHS.	Estimated civil population, 1917.	Notified Cases of Infectious Disease.											Deaths from Principal Infectious Diseases.									
		Small-pox.	Scarlet fever.	Diphtheria.*	Typhus fever.	Enteric fever.	Other continued fevers.	Puerperal fever.	Erysipelas.	Cerebro-spinal meningitis.	Poliomyelitis.	Total.	Annual rate per 1000 persons living.	Small-pox.	Measles.	Scarlet fever.	Diphtheria.*	Whooping-cough.	Enteric fever.	Diarrhœa and enteritis (under 2 years).	Total.	Annual rate per 1000 persons living.	Deaths from all causes.	Death-rate per 1000 living.
LONDON...	4,026,901	—	504	661	—	41	—	18	148	13	9	1394	4·5	—	151	5	45	98	9	28	336	1·1	3655	11·8
West Districts:																								
Paddington	122,507	—	10	20	—	1	—	1	7	1	—	40	4·3	—	2	—	2	—	—	1	5	0·5	89	9·5
Kensington	151,535	—	10	17	—	1	—	1	7	1	—	37	3·2	—	4	1	—	4	—	1	10	0·9	138	11·9
Hammersmith ...	114,962	—	11	18	—	—	—	1	2	—	—	32	3·6	—	3	—	—	1	—	3	7	0·8	94	10·7
Fulham	145,188	—	15	12	—	—	—	2	4	—	—	33	3·0	—	7	1	—	8	1	1	18	1·6	123	11·0
Chelsea	57,368	—	5	2	—	1	—	—	1	—	—	9	2·0	—	3	—	—	2	—	—	5	1·1	60	13·6
City of Westminster	122,046	—	3	8	—	3	—	—	2	—	—	16	1·7	—	2	—	1	2	1	—	6	0·8	121	12·9
North Districts:																								
St. Marylebone ...	92,796	—	5	19	—	1	—	1	6	—	1	33	4·6	—	2	—	2		1	2	10	1·4	105	14·7
Hampstead	75,649	—	7	11	—	—	—	—	2	—	—	20	3·4	—	—	—	2	—	—	1	3	0·5	59	10·2
St. Pancras	186,600	—	25	30	—	—	—	—	11	—	—	66	4·6	—	7	—	3	2	—	—	12	0·8	192	13·4
Islington	297,102	—	30	41	—	3	—	—	7	—	—	81	3·6	—	1	—	1	12	—	2	16	0·7	274	12·0
Stoke Newington...	47,426	—	—	13	—	—	—	—	1	1	—	15	4·1	—	1	—	1	—	—	1	3	0·8	35	9·6
Hackney	196,598	—	13	29	—	5	—	—	6	—	—	53	3·5	—	4	—	2	5	—	1	12	0·8	189	12·5
Central Districts:																								
Holborn	35,303	—	4	1	—	1	—	—	—	—	—	6	2·2	—	—	—	—	1	1	—	2	0·7	34	12·6
Finsbury	68,011	—	22	10	—	—	—	—	3	—	—	35	6·7	—	1	—	1	4	—	—	6	1·2	83	15·9
City of London ...	16,138	—	—	1	—	—	—	—	—	—	—	1	0·8	—	—	—	—	1	—	1	2	1·6	13	10·5
East Districts:																								
Shoreditch	89,675	—	10	14	—	2	—	—	6	—	—	32	4·7	—	—	—	1	1	—	—	2	0·3	88	12·8
Bethnal Green ...	107,362	—	7	27	—	2	—	1	9	—	1	47	5·7	—	10	—	1	—	—	—	11	1·3	113	13·7
Stepney	232,010	—	18	56	—	2	—	—	7	3	—	88	4·8	—	6	—	5	—	2	—	13	0·7	217	12·2
Poplar	143,443	—	10	24	—	—	—	1	6	1	1	43	3·9	—	5	—	2	3	—	2	12	1·1	142	12·9
South Districts:																								
Southwark	167,936	—	48	50	—	1	—	2	7	—	—	108	8·4	—	19	1	2	15	—	—	37	2·9	203	15·8
Bermondsey	107,635	—	18	41	—	—	—	1	5	1	3	69	8·4	—	10	—	3	1	—	1	15	1·8	102	12·4
Lambeth	272,038	—	43	44	—	1	—	2	6	3	—	99	4·7	—	16	—	4	7	1	1	29	1·4	252	12·1
Battersea	150,023	—	18	16	—	3	—	—	5	—	—	42	3·6	—	15	—	1	4	—	1	21	1·8	111	9·6
Wandsworth	300,787	—	52	46	—	9	—	2	2	—	—	111	4·8	—	7	1	2	1	1	1	13	0·6	204	8·8
Camberwell	239,461	—	38	34	—	2	—	—	13	—	—	87	4·7	—	18	—	4	3	—	—	25	1·4	214	11·6
Deptford	103,527	—	16	13	—	1	—	—	13	—	1	44	5·5	—	5	—	2	8	—	1	16	2·0	110	13·9
Greenwich	90,440	—	30	16	—	—	—	—	7	1	—	54	7·8	—	3	—	1	1	—	3	8	1·2	83	12·0
Lewisham	161,405	—	13	41	—	—	—	1	—	—	—	55	4·4	—	—	1	2	6	1	—	10	0·8	115	9·3
Woolwich...	131,942	—	22	6	—	2	—	2	3	1	2	38	3·8	—	—	—	—	3	—	4	7	0·7	92	9·1
Port of London ..	—	—	1	1	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—

* Including membranous croup.

URBAN VITAL STATISTICS FOR WEEK ENDED JULY 6TH, 1918.

English and Welsh Towns.—In the 96 English and Welsh towns, with an aggregate civil population estimated at 16,500,000 persons, the annual rate of mortality was 19·0 per 1000, which with one exception was the highest rate recorded in any week of the present year; in the three preceding weeks the rates were 11·4, 11·7, and 13·2 per 1000. In London, with a population slightly exceeding 4,000,000 persons, the death-rate was 17·4, or 4·2 per 1000 above that recorded in the previous week; among the remaining towns the rates ranged from 4·4 in Southend-on-Sea, 5·8 in Wimbledon, and 6·0 in Cambridge to 41·2 in Sunderland, 41·4 in Huddersfield, 44·6 in Middlesbrough, and 45·6 in Rochdale. The principal epidemic diseases caused 340 deaths, which corresponded to an annual rate of 1·1 per 1000, and included 142 from whooping-cough, 108 from measles, 42 from infantile diarrhœa, 33 from diphtheria, 10 from scarlet fever, and 5 from enteric fever. Measles caused a death-rate of 2·6 in Sunderland, 3·6 in Lincoln, and 7·6 in Barnsley; whooping-cough of 2·3 in Warrington, 2·8 in Merthyr Tydfil, 2·9 in Preston, and 3·0 in Walsall; and diphtheria of 2·3 in St. Helens. The 830 cases of scarlet fever and 1146 of diphtheria under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital were 27 and 43 below the respective numbers remaining at the end of the previous week. The 1340 deaths from all causes in London included 218 from influenza, of which 110 were of persons aged 15 to 35 years. The causes of 77 deaths were uncertified, of which 23 were registered in Birmingham, 5 each in Liverpool and Sunderland, and 4 in South Shields.

Scotch Towns.—In the 16 largest Scotch towns, with an aggregate population estimated at nearly 2,500,000 persons, the annual rate of mortality was 13·9, against 11·8 and 11·5 per 1000 in the two preceding weeks. The 273 deaths in Glasgow corresponded to an annual rate of 12·8 per 1000, and included 7 from whooping-cough, 3 each from measles, scarlet fever, and diphtheria, 2 from infantile diarrhœa, and 1 from enteric fever. The 82 deaths in Edinburgh were also equal to a rate of 12·8 per 1000, but no fatal case of the principal epidemic diseases was recorded during the week.

Irish Towns.—The 179 deaths in Dublin corresponded to an annual rate of 23·4, or 7·7 per 1000 above that recorded in the previous week, and included 4 from whooping-cough and a fatal case each of measles, diphtheria, and infantile diarrhœa. The 335 deaths in Belfast were equal to a rate of 44·4 per 1000, and included 6 from whooping-cough, 5 from infantile diarrhœa, 2 from measles, and 1 each from enteric fever and diphtheria.

Medical News.

ROYAL COLLEGES OF PHYSICIANS OF LONDON AND SURGEONS OF ENGLAND.—At the Second Professional Examination in Anatomy and Physiology, held on June 27th and 28th and July 1st and 2nd, 81 candidates presented themselves, of whom 43 were approved and 38 were referred. The following are the names and medical schools of the successful candidates:—

A. H. Abdel-Messieh and M. V. Abraham, Manchester University; F. Blake, King's College; C. H. Bulcock, St. Bart.'s Hosp.; C. L. C. Burns, St Thomas's Hosp.; Marion Constance Vera Clarke, Royal Free Hosp; C. S. Cloake, London Hosp.; J. L. Cope, Cambridge University and St. Bart.'s Hosp.; P. G. Cumming, King's College; S. Douglas, Sydney University and University College; F. W. Crook, Guy's Hosp.; W. L. Dunlop, Liverpool University; F. T. Evans, St. Bart.'s Hosp.; H. Freeman, King's College; S. A. Gunter, St. Bart.'s Hosp.; R. Henein, Cairo and Manchester University; F. W. Herbert, Charing Cross Hosp.; H. D Lawson, London Hosp.; K. W. Leon, St. Bart.'s Hosp.; W. B. A. Lewis, Cambridge University and St. Bart.'s Hosp.; G. M. Lewis, University College; Elizabeth Kathleen Mackay and A. Mikhail, King's College; L. S. Morgan, St. Bart.'s Hosp.; J. N. Morris, King's College; E. D. Nagel, St. Thomas's Hosp.; J. L. Nisbet, St. Bart.'s Hosp.; R. M. Patterson and W Remington, Guy's Hosp.; Constance Elizabeth Ridout and Mary Jane Ripley, Royal Free Hosp.; L. C. Rogers, Middlesex Hosp.; Mary Frances Roope, King's College; I. Rosenberg, Guy's Hosp.; L. Smalley, St. Thomas's Hosp.; H. K. Snell, King's College; J. A. Stephens, Leeds University; E. R. Stearn, D. R. Thompson, and H. M. Toop, London Hosp.; A. R. Walker, Cambridge University and St. Thomas's Hosp.; J. G. Walker, King's College; and J. F. Weakley, University College.

ROYAL COLLEGE OF SURGEONS OF ENGLAND: ELECTION OF MEMBERS OF COUNCIL.—A meeting of Fellows of the College was held at the College on July 4th, Sir George Makins, the President, being in the chair, for the purpose of electing four members of Council. The following was the result of the poll:—

	Votes.	Plumpers.
Sir John Bland-Sutton	410	37
W. G. Spencer	322	9
E. W. Hey Groves	307	25
J. Lynn Thomas	266	14
F. J. Steward	229	54
H. B. Grimsdale	185	28

The President declared that Sir John Bland-Sutton and Mr. Walter Spencer had been elected, and that Mr. Hey Groves and Mr. Lynn Thomas had been elected members of the Council. Five Fellows voted in person and 620 voted through the post. Mr. H. J. Price and Mr. Willmott Evans acted as scrutineers.

WEST LONDON MEDICO-CHIRURGICAL SOCIETY.—The annual general meeting will be held at the West London Hospital on Friday, July 19th, beginning at 5.30 P.M., when the report of the council will be read and officers elected for 1918–19.

ROYAL COLLEGES OF PHYSICIANS AND SURGEONS, IRELAND.—The Reuben Harvey Memorial Prize has been awarded to William Robert Fearon, B.A., B.Sc., for an essay on "The Amylolytic Properties of Urine," and a second prize to Joseph Warwick Bigger, M.B., for one on "The Effect of Keeping on the Complementary Power of Guinea-pig Serum."

ROYAL MEDICAL BENEVOLENT FUND GUILD.—We may remind our readers of the garden party in aid of the Guild to be held in the Royal Botanic Gardens, Regent's Park, London, on Tuesday, July 16th, from 2.30–7 P.M. Lady Tweedy, chairman of the Guild, desires it to be known that inexpensive and useful gifts for the auction sales may be sent to her at 100, Harley-street, W. 1.

DEVON COUNTY MENTAL HOSPITAL.—The Committee of Visitors of the Devon County Asylum has decided to change the name of the institution to Devon County Mental Hospital. There are at present 1381 patients in the institution, and it has been arranged that some of the wards shall be fitted up to accommodate 200 sick and wounded soldiers.

PUBLIC HEALTH (TUBERCULOSIS) REGULATIONS, 1918.—In view of the recent alterations in the limits of age of men liable to military service, the Local Government Board have issued an Order requiring every medical officer of health to send to the Chief Commissioner of Medical Services particulars of every male person between the ages of 16 and 53 years notified as suffering from tuberculosis. The information, as heretofore, is to be regarded as confidential.

THE MCQUITTY EXHIBITION.—The McQuitty exhibition (founded as a memorial of the late Dr. W. B. McQuitty, physician to the Belfast Royal Victoria Hospital), awarded to senior students attending the Royal Victoria Hospital, Belfast, for excellence in clinical medicine, surgery, gynæcology, and ophthalmology (with pathology), has this year been gained by Mr. W. J. Lyttle.

BRISTOL ROYAL INFIRMARY.—The report for 1917 of the Bristol Royal Infirmary has just been issued. The medical statement shows that nearly 50,000 civilian patients and 4200 military cases were treated during the year. The adverse balance against the institution is now over £14,000. The committee make a strong appeal for increased financial support. What is more especially wanted is a regular income of £15,000 from annual subscriptions; at present this amounts to barely £10,000, but the Bristol residents have so generously supported their infirmary in the past that the required sum should be eventually raised.

MEDICO-PSYCHOLOGICAL ASSOCIATION OF GREAT BRITAIN AND IRELAND.—The annual meeting of the association will be held on Tuesday and Wednesday, July 23rd and 24th, at Edinburgh. The presidential address will be delivered by Lieutenant-Colonel John Keay, R.A.M.C., at 2 P.M., on Tuesday, and papers will be read: Dr. W. Ford Robertson on "The Infective Factors in Some Types of Neurasthenia," and by Dr. Claud F. Fothergill on "The Prevention and Treatment of Neurasthenia and other Functional Nervous Breakdowns." On Wednesday, at 2.30 P.M., at the Edinburgh War Hospital, Bangour, Lieutenant-Colonel C. W. Cathcart and Major Rankine will give a demonstration on provisional artificial limbs, Sir Harold J. Stiles will show cases from the orthopædic department, Captain Edwin Bramwell cases illustrating functional neuroses, and Major D. G. Marshall and Dr. L. K. Davies will give a microscopical demonstration on malaria and dysentery.

WE are informed that a few cases of "influenza" can be received at the London Fever Hospital, Liverpool-road, London, N.

A SECOND edition of Sir Rickman Godlee's life of Lord Lister has just appeared (Macmillan and Co.), in which a few minor additions and corrections, chiefly of dates, have been made.

THE project of endowing a bed in the Royal City of Dublin Hospital in memory of the late Lieutenant-Colonel Henry Moore, R.A.M.C., has now assumed a definite form, and an influential committee has been elected for the purpose. Mr. G. Jameson Johnston, F.R.C.S.I., 13, Lower Fitzwilliam-street, Dublin, is the honorary treasurer.

UNDER the auspices of the London County Council a course of lectures on the Care of Mother and Child, with special reference to the work of midwives, is being given at the Birkbeck College, London, E.C., at 4 P.M. on July 15th and 22nd, by Dr. F. Truby King, C.M.G. The same course is also being given at the Morley College, Waterloo-road, London, S.E., at 4 P.M. on July 18th and 24th, by Dr. Truby King. The lectures will be illustrated by lantern slides and practical demonstrations.

Obituary.

SIR JAMES ACHESON MACCULLAGH, M.D. DUB., J.P.

WITH tragic suddenness the death of this well-known and much-esteemed member of the medical profession in Ireland occurred on the evening of Wednesday, July 3rd, in Roscommon. In his capacity as medical inspector of the Local Government Board for Ireland he had been engaged on the day of his death in his customary quarterly inspection of the Western District entrusted to his care. Half an hour before he died he had been seen walking through the streets of the town apparently in his usual health, which, however, had not been robust for some years. In the afternoon, while engaged in conversation he suddenly expired from valvular disease of the heart.

James Acheson MacCullagh was born in Dublin on Oct. 4th, 1854, and was the son of John MacCullagh, resident magistrate of Newry, co. Down, and of Wilhelmina, daughter of Acheson O'Brien, D.L., of Drumsilla, co. Leitrim. He was educated at Ennis College, co. Clare, and Trinity College, Dublin. He graduated in arts in 1875. In February, 1875, he joined the clinical class at the Meath Hospital and County Dublin Infirmary, and some two years later acted as clinical clerk to Dr. (now Sir) John Moore, physician to the hospital. In 1878 he graduated in medicine in the University of Dublin and in 1892 he proceeded to the degree of Doctor of Medicine, *stipendiis condonatis* in view of his attainments. Shortly after graduation Dr. MacCullagh became house surgeon to the Derry City and County Infirmary and the City of Londonderry Fever Hospital, having meanwhile taken the additional surgical qualification of the Royal Faculty of Physicians and Surgeons of Glasgow. He was also appointed a medical officer to one of the dispensary districts of Derry, and in that historic town he established his reputation as a painstaking and clever physician. Dr. MacCullagh became a member of the borough council, and in three successive years filled the office of Mayor of Derry; in 1896 he received the honour of knighthood.

Sir J. Acheson MacCullagh joined the medical staff of the Local Government Board for Ireland in June, 1898, and during the past 20 years the Western District has been the scene of his services. No part of Ireland makes greater demands on the energy and character of a medical inspector; it is subject to recurring outbreaks of typhus fever and enteric fever, though now happily to a much less extent than in past years. Working under such circumstances among a population of primitive ideas and habits, with sparse hospital facilities and undeveloped means of transit, and often cut off from ready communication with headquarters, a medical inspector needs to exhibit exceptional qualities of decision and resource. Sir Acheson MacCullagh in his long career was frequently called on to deal with epidemics of enteric and typhus fever under these conditions, and never failed to acquit himself with distinction. On one occasion in a remote island he had in face of a local panic to render personal assistance in removing typhus patients from their homes among the rocks and heather to the building which was fitted up as an emergency hospital. For his eminent services in this instance he was awarded the Order of St. John of Jerusalem. He could always be relied on to deal with a difficult situation with promptitude and sound judgment, and to his zeal and activity may be attributed the comparative immunity from serious outbreaks of fever which the isolated districts along the Atlantic seaboard have enjoyed in recent years. Although often called on to act with firmness, he succeeded in retaining the goodwill and support of the local authorities and officers with whom he was brought in contact. His long experience of typhus fever was constantly appealed to by medical officers in cases where diagnosis was obscure.

In an appreciative note to the writer of this memoir, touching the occasion and manner of Sir Acheson MacCullagh's death, his chief, Dr. E. Coey Bigger, Medical Commissioner of the Local Government Board for Ireland, writes under date July 6th:—

"I need hardly say that he was beloved by all who came in contact with him, not only in the department of the Local Government Board, but throughout his own district, where he was looked upon by the medical officers at large as a personal friend and a trusty adviser."

In 1880 he married Ida, a daughter of Mr. M. McClelland, J.P., of Glendarragh, Londonderry. J. W. M.

Parliamentary Intelligence.

NOTES ON CURRENT TOPICS.

Maternity and Child Welfare Bill.

THE Maternity and Child Welfare Bill passed through Committee in the House of Commons on Tuesday, July 9th. The discussion turned largely on points connected with the machinery of local administration. A new clause in the names of Sir WATSON CHEYNE and Major ASTOR, proposing a transfer of the powers under the Bill to a Ministry of Public Health in the event of the latter being created, was ruled out of order.

HOUSE OF COMMONS.

WEDNESDAY, JULY 3RD.

Grading under the New Military Service Act.

Sir C. HENRY asked the Parliamentary Secretary to the Ministry of National Service whether he would state, of those medically examined who were within the new age-limit as provided by the Military Service Act, 1918, the percentage that had been passed into Grades 1 and 2.—Mr. BECK answered: The percentage of men placed by the medical boards in Grade 1 and Grade 2 is different in each year of age. A comprehensive percentage covering the whole of the new age-period would therefore tend to mislead those interested in the results of the medical examinations and yet would give information which might be of value to the enemy. In view of these circumstances it seems undesirable to publish the information asked for.

Commissions in the R.A.M.C.

Mr. PENNEFATHER asked the Under Secretary for War what qualifications were necessary to enable a man to be appointed a quartermaster and given a commission in the Royal Army Medical Corps; whether any Royal Army Medical Corps commissions had been given to schoolmasters, architects, and others as sanitary officers; and, if so, what were the qualifications necessary for the holding of such commissions.—Mr. MACPHERSON replied: Appointments of quartermasters in the R.A.M.C. are usually reserved for qualified warrant officers and non-commissioned officers and ex-warrant officers and non-commissioned officers of the R.A.M.C. In the early part of the war, owing to there being an insufficient number of R.A.M.C. candidates, a limited number of other persons were appointed. The officers of sanitary companies must be conversant with sanitary science but need not necessarily be medical men.

Appeal Tribunal on Officers' Disabilities.

Colonel ASHLEY asked the Parliamentary Secretary to the Ministry of Pensions whether he would give some information as to the composition of the appeal tribunal which dealt with the cases of officers who claimed that their disability was owing to, or was aggravated by, military service, but who had been unsuccessful in obtaining pensions; whether it included legal as well as medical members; when and where it sat; and whether he would state the steps necessary for an officer to take who desired to bring his case before such a tribunal.—Sir A. GRIFFITH-BOSCAWEN said in reply: The Appeals Board is constituted as follows: Chairman, Sir Ernest Pollock, K.C., M.P.; Sir Frederick Taylor, Bart., F.R.C.P., Sir Alfred Pearce Gould, F.R.C.S., and Captain Albert Smith, M.P. The Board meets at intervals as the cases to be dealt with require at Bridgewater House, St. James's. An officer whose appeal to the Ministry of Pensions has been considered and rejected may ask the Ministry for it to be referred to the Appeals Board. This is then arranged, and the officer informed of the date and place.

The Reported Deaths from Small-pox in Suffolk.

Mr. CHANCELLOR asked the President of the Local Government Board how many of the five small-pox deaths in the county of Suffolk reported in the quarterly return of the Registrar-General for the first three months of 1918 were civil, military, and naval respectively; and what was the vaccinal condition in each case.—Mr. HAYES FISHER replied: I am informed by the Registrar-General that the cases referred to were wrongly entered as small-pox. They should have been entered as whooping-cough.

Medical Treatment of School Children.

Mr. ROWNTREE asked the President of the Board of Education whether he could state the local authorities which were not providing medical treatment for school children.—Mr. HERBERT FISHER replied: The following is a list of the 39 local education authorities in England and Wales who, in 1917, did not submit schemes for sanction by the Board of Education under Section 12 (1) (b) of the Education Administrative Provisions Act, 1907, for medical treatment of school children: Isle of Ely, Kingston-on-Thames, Herefordshire, Morecambe, Hertfordshire, Middlesex, Mossley, Soke of Peterborough,

Ossett, Penzance, Staffordshire, Pontefract, Suffolk (East), Pudsey, Sussex (East), Royal Leamington Spa, Yorks (North Riding), Stalybridge, Carmarthenshire, Sutton Coldfield, Canterbury, Carmarthen, Dudley, Llanelly, Gateshead, Coseley, Great Yarmouth, Edmonton, Rotherham, Farnworth, Barnstaple, Felling, Berwick-on-Tweed, Ince-in-Makerfield, Congleton, Glossop, Oldbury, Hornsey, and Spenborough. In 1916 the number of such authorities was 45. It must not be assumed that all these authorities, while themselves incurring no expenditure, make no arrangements which secure, or aim at securing, the treatment of defects by private practitioners or voluntary organisations.

THURSDAY, JULY 4TH.

The Medical Service in France.

Sir WILLIAM COLLINS asked the Under Secretary for War whether, in view of the objections raised to recruiting medical men between 50 and 55 years of age and the allegations that medical men with the Army in France were insufficiently occupied, he had now further considered the desirability of making public the report of the committee which recently investigated the employment of medical men with the Army in France, and with what result.—Mr. MACPHERSON answered: There is no evidence that medical men in France are insufficiently occupied. It is not intended to publish the report of the committee.

Blackburn Medical Board.

Mr. SNOWDEN asked the Parliamentary Secretary to the Ministry of National Service whether he was now in a position to report the result of his inquiry into the methods of the Blackburn Medical Examining Board, who are passing totally unfit men into the Army.—Mr. BECK answered: Inquiries have been made into the methods of the Blackburn Medical Board, and no evidence can be found in support of the allegations made against it.

Medical Appeals in the Yorkshire Region.

Mr. JOWETT asked the Parliamentary Secretary to the Ministry of National Service how many appeals had been made on the ground of wrong grading as to medical fitness for military service at the West Riding of Yorkshire Appeal Court; and how many of such appeals had been granted.—Mr. BECK answered: The necessary information regarding the West Riding Appeal Tribunal is not available, but the following are the figures in respect of all appeal tribunals in the Yorkshire region during the period March 9th, 1918, to June 29th, 1918, inclusive: Number of applications made to an appeal tribunal in the Yorkshire region for re-examination by the medical assessors 1472, of which 252 cases have not yet been heard. Number of appeals allowed 283. It is not known in how many of these "appeals allowed" the medical assessors have altered the grading.

Extra Rations to Invalids.

Answering Sir FREDERICK HALL, Mr. PARKER (on behalf of the Ministry of Food) stated that food control committees were empowered to grant extra rations to invalids in the case of certain specified diseases only. Rheumatoid arthritis was not one of these. They were also empowered in any exceptional case of disease in which they were of opinion that a special allowance of meat or butter should be granted to forward the application to the Ministry of Food for the consideration of the medical adviser.

Supplies of Salvarsan Substitutes.

Mr. SNOWDEN asked the President of the Local Government Board what payments were made to the manufacturers of the salvarsan substitutes as supplied to local authorities, and from what funds were these payments made.—Mr. HAYES FISHER answered: The payments made by local authorities to manufacturers for supplies of salvarsan substitutes are at the minimum rates prescribed by the licences issued by the Board of Trade, and are at the same rate as those charged to Government departments for supplies of these preparations. The payments are made in the first instance from the funds of the local authorities, but 75 per cent. of their expenditure for this purpose is repaid by the Local Government Board.

MONDAY, JULY 8TH.

New Grading of the Older Men.

Answering Sir DONALD MACLEAN, Sir AUCKLAND GEDDES (Minister of National Service) said: Conferences have been held, with the President of the Local Government Board in the chair, between the Minister of National Service, chairmen of Tribunals, and other Members of Parliament, with the following result. It was agreed that the following classifications should be introduced for men of the new military age with regard to their fitness for military service. In future men of these ages passed by Medical Boards as fit for Grade I. will be classified as Grade I. (B i.). Similarly, men of these ages passed as fit for Grade II. will be classified Grade II. (B ii.), and those passed as fit for Grade III. will be classified as Grade III. (B iii.). These classifications will be distinctly marked on the grading cards. Instructions will be immediately issued by the Local Government Board to tribunals that in considering the relative military value of Grade I. (B i.) they must assume these men are "not fit to be trained for first line infantry," and that in considering the relative military value of men in the new classifications, Grade II. (B ii.) and Grade III. (B iii.), they must assume that they are of substantially less military value than men under the previous Military Service Acts who were placed in Grade II. or Grade III. respectively. Instructions will be given to each National Service representative that if and when requested by a tribunal he shall state whether a man placed in Grade III. has been found by the medical board to be fit only for sedentary work. Certain other points were discussed. The Minister of National Service informed the Conference that he had already issued instructions that no notice calling up a man of the new ages for service was to give shorter notice than 14 days, nor was it to be issued until ten days after the date upon which the man was due to report for medical examination. He further informed the Conference that he had instructed all Directors of National Service to see that the unauthorised use of books which recruits were asked to sign at medical boards, stating that they were satisfied with their examination, was to be discontinued, and that he had prohibited the adoption of any practice of this nature. It was agreed that greater publicity should be given to the opportunity of every man to apply for a second examination by a National Service Medical Board if he were dissatisfied with his first examination, and, further, that attention should be drawn by means of a printed intimation enclosed with the notice to report himself for medical examination of the limit of five days to the time within which he may apply to an Appeal Tribunal for permission to be examined by the Appeal Medical Assessors.

Mr. PRINGLE: Will an opportunity be given to the men who have come before tribunals to have their cases reopened in view of this decision?—Sir A. GEDDES: I do not think it would be quite easy to say that every case should be reopened, because many of the cases the tribunals might not wish to hear further. But I imagine that an application for a re-hearing will be considered.

Mr. ALBION RICHARDSON: Is it not the fact that a man is entitled as a matter of right to obtain a re-hearing of his case on the ground that a new and material fact has arisen since the case was last heard?—Sir A. GEDDES: He has a right to apply, but the tribunal may refuse the application.

Mr. FRANCE: Was the number of medical men on the board considered at the Conference and the length of time to be given to the medical examination?—Sir A. GEDDES: The number of doctors on the board was not discussed at the Conference. I think it was referred to once, but it was not discussed or made an important point.

Medical Grading.

Sir CHARLES HENRY asked the Parliamentary Secretary to the Ministry of National Service whether of those who were within the new age limit as provided by the Military Service Act, 1918, who were medically examined up to June 30th, the percentage passed into Grade I. and Grade II. was in excess of or below the percentage that he anticipated when the measure was passed; and, if so, to what extent in percentage.—Mr. BECK replied: Of the men medically examined up to June 29th who were above the former military age the percentage passed as Grade I. and Grade II. was about 12 per cent. less than anticipated. I must again point out that these percentages are based on a review at present necessarily incomplete and are liable to be misleading.

WEDNESDAY, JULY 10TH.

A Ministry of Health.

Answering Major ASTOR, Sir G. CAVE (Home Secretary) said: The proposal for a Ministry of Health Bill has been referred to the Committee of Home Affairs, and was considered by the Committee at its first meeting yesterday. After discussion it became clear that the proposal raised questions of some difficulty, and it was decided to adjourn the consideration of the Bill to a special meeting of the Committee to be held early next week. It is, I think, obvious that it would be impossible to pass such a Bill before the adjournment of the House in August next.

Major ASTOR: Will the Bill be introduced before the adjournment?—Sir G. CAVE: I cannot answer that until the Committee has decided.

At a later stage Major ASTOR proposed to ask leave to move the adjournment of the House in order to raise, as a matter of urgent public importance, the delay in introducing a Bill to set up a Ministry of Health.

The SPEAKER, however, in declining to allow the honourable and gallant gentleman to take this course, pointed out that a blocking motion was down on the order paper, and this, combined with the probability that there would be an opportunity of raising the matter within a reasonable time, shut out such a motion for the adjournment.

THE SERVICES.

ROYAL NAVAL MEDICAL SERVICE.

R. B. Campbell to be temporary Fleet-Surgeon.

To be temporary Surgeons: D. J. Micah, J. V. Mainprize, D. S. Prentice.

To be temporary Dental Surgeons: T. P. H. Roberts, R. Page, J. C. Payne.

ROYAL ARMY MEDICAL CORPS.

Major A. L. B. Green, Hereford Regiment (T.F.), to be temp. Major.

Temporary Captains relinquishing the acting rank of Major on re-posting: T. Martin, H. J. de Brent, A. S. K. Anderson, T. T. Higgins, F. C. Tibbs.

Temporary Captains to be acting Majors: J. F. R. Gairdner, J. McN. Murray, N. G. W. Davidson, H. Dudley, R. H. R. Whitaker, R. Hodson, J. G. Johnston, R. J. Vernon, S. J. L. Lindeman, A. M. Wood, R. R. Blair, W. B. G. Angus, H. C. Watson.

To be acting Majors while specially employed: Temp. Major M. Bridgman, Temp. Major C. M. Row, Temp. Capt. E. W. Willett.

To be Captains:—Captains from Special Reserve: R. A. Hepple, J. Y. Moore, A. L. Robertson, T. I. Dun, R. H. Leigh, H. G. Trayer, R. A. Austin, C. Popham, C. de W. Gibb, G. P. Kidd, S. D. Robertson, T. K. Boney, S. S. B. Harrison, H. D. Lane, F. C. Chandler, H. S. Milne, Q. V. B. Wallace, J. P. Quinn, J. B. Fotheringham; Temp. Capts. W. E. Adam, C. S. P. Hamilton, C. A. Bernard, R. E. Gibson, K. P. MacKenzie, E. G. Foley, S. Smith, J. H. Fletcher, J. H. Barry, G. D. R. Carr, D. H. Hadden, E. F. W. MacKenzie, C. Scales, A. Wilson, C. K. G. Dick, T. R. Snelling.

To be temporary Captains: Capt. S. S. Dunn (ret., Australian Army Medical Corps), attached R.A.M.C.; Temp. Lieut. A. J. Ferguson.

To be Lieutenants, and to be granted the temporary rank of Captain:—Captains from Special Reserve: F. J. Hallinan, J. H. Baird, W. D. Anderton, T. D. Inch, W. T. Hare, J. D. Proud, J. E. Rusby, J. H. C. Walker, M. B. King, W. Hunt, C. A. Slaughter, W. H. Ferguson, G. G. Drummond, F. G. L. Dawson, W. M. Cameron, A. Rodd, D. J. Batterham. Temporary Captains: T. J. L. Thompson, A. G. P. Hardwick, R. D. Davy, J. M. McKenzie, A. J. Hickey, W. J. Robertson, C. Russell, W. J. Knight, R. A. Mansell, W. L. Partridge, W. D. Newland, L. S. C. Roche, G. T. Baker, G. T. Garraway, G. E. Spicer. Captains from Territorial Force: S. Robertson, R. T. Jones.

Temporary Lieutenants to be temporary Captains: W. F. Erskine, O. May, G. A. Hoffmann, R. Alderson, W. P. Miles, J. Lambie, H. O'H. O'Neill, C. W. Preston-Hillary, H. G. F. Spurrell, S. E. Atkinson, J. Avery, H. V. Mitchell, W. B. Wilson, P. W. Hampton, R. Crawford, K. McK. Duncan, J. Ritchie, W. Anderson, W. Lilico, H. B. Wickham, J. Hunter, J. F. Bridge, J. Wylie, S. D. Craig, L. Hutchinson, E. S. Prior, E. O'D. Graham, R. Duncan, H. O. West, E. W. Witney, S. H. White, G. H. C. Lumsden, A. E. Knapp, Q. Madge, O. V. Payne, G. W. Curtis, W. A. Allison, E. Tate, J. D. Ferguson, A. J. May, A. B. Sykes, A. C. Renton, R. H. Thomson, F. G. Ralphs, W. H. F. Eales, J. A. Wood, T. Clarke, H. R. Wright, F. W. Pollard, V. G. Best, T. Gillespie, W. E. Waymark, J. Williamson, S. Wood, J. A. McSweeny, R. E. G. Gray, A. E. Leapingwell, H. T. P. Young, H. M. Roberts, J. F. Peart, A. Brown, W. B. Primrose, W. Weir, J. B. Aickin, J. A. Mearns, W. Mair, J. Steward, G. A. Pratt, A. H. B. Hartford, R. Peart, W. W. Cawlow, P. Talbot, J. C. Wootton, A. W. Ewing, W. Rotherham, A. Evans, A. C. Russell, J. Wilson, C. M. Ockwell, J. Dunbar, T. P. Robertson, L. Welply, F. H. Fuller, N. E. Sampey, J. J. F. Knight, C. B. Ticehurst, F. W. MacKichan, R. Brown, J. Scott, F. H. Dodd, J. H. Jones, D. P. Lindsay, L. H. Werden, N. Gray, J. S. Wilson, C. L. Driscoll, E. E. Paget-Tomlinson, G. C. Anderson, H. W. Horan, R. G. Smith, P. D. Hunter, B. J. Cusack, E. A. Sanders, J. R. Munro, R. J. W. McKane, J. Ferguson, D. D. Ritchie, R. J. Bentley, S. B. Sweet, H. Spurway, A. I. Shepherd-Walwyn, G. E. Thornton, W. S. Graham, J. K. Manson, J. Dalgleish, J. L. Meynell, E. M. Mail, S. W. White, J. K. Reid, W. Tregea, W. B. Clarke, S. N. Galbraith, E. MacM. Mahon, J. B. Cook, J. Grogono, E. W. Grogono, E. P. Harding, B. Kelly, C. A. B. Horsford, C. A. Lawrence, J. B. Banister, J. Ellenbogen, E. Morrison, P. J. Hay, J. A. W. Ponton, J. C. Ryan, B. Suggit, F. H. Diggle, A. M. Malcolmson, A. Tait, M. S. Wood, A. R. Taylor, G. H. Hackney, O. Smith, J. Cross, C. H. G. Lyall, E. Morgan, T. A. Davies, T. Kennedy, B. B. Phillips, C. B. Gerrard, C. B. M. Aldridge, R. N. Woodsend, J. McGibbon, R. T. A. Patchett, L. Wayne-Morgan, A. H. Gray, F. Crooks, H. Baird, V. J. Rigg, M. Aikman, P. L. Pollard, W. Cook, R. S. Strachan, D. O. Fairweather, T. Fraser, C. Brash, R. Taylor, J. D. Oliver, J. A. Powell, J. N. M. Sutherland, A. Matheson, F. L. Thomas, J. W. A. Wilson, D. L. G. Radford, F. A. Morrison, D. P. Smith, P. A. Hendley, S. W. Swindells A. Westerman, G. Eager, E. G. D. Benson, G. Milne, C. M. Stevenson, U. Marks, T. B. Valle, A. H. Duckett, J. J. Todd, D. W. Tacey, H. R. Cran, R. N. Dunlop, J. G. Woolham, N. H. M. Burke, J. D. Hartley, J. D. Jones, G. Denholm, A. F. Waterhouse, M. D. Mackenzie, L. D. Callander, J. Dawson, H. C. Taylor, J. B. H. Holroyd, H. E. Middlebrooke, W. H. Parsinson, H. Maffin, T. Brodie, G. L. Langley, F. de R. Martyn, W. B. Peacock, A. O. Bisson, J. F. Lindsay, F. McG. Loughnane, C. Gray, G. D. Dawson, H. A. Mason, J. Gilchrist, J. Orr, J. W. McDougall, G. Mowat, D. R. C. Shepherd, C. L. Stewart, E. C. Roberts, H. F. Marshall, H. R. L. Allott, F. F. C. Willington, R. C. Pitt, A. J. Adkins, W. H. Gibson, J. T. R. MacGill, D. Longwill, M. J. Macauley, F. H. Mosse, D. P. Macdonald, L. D. Wright, R. Fraser, E. J. Manning, C. J. Taylor, W. Duguid, St. G. M. L. Homan, C. W. C. Harvey, G. E. A. Mitchell, T. R. Couldrey, P. J. O'Brien, J. Fortune, I. B. Richardson, C. H. Gunson, W. B. A. Moore, e S. G. Johnson, R. W. Dale, A. G. Bland, A. S. Findlay, J. A. Hagerty, H. P. Wright, F. D. Scott, W. H. Gowans, A. G. Stewart, J. W. Robertson, G. Garland, A. R. Jennings, H. Thorp.

A. E. J. Barcroft and T. Bell, late temporary Captains, are granted the honorary rank of Captain.

Temp. Hon. Lieut. D. A. Bartley to be temporary honorary Captain.

Officers relinquishing their commissions: Temp. Major W. Robinson (on ceasing to be employed at the Sutherland War Hospital); Temp. Capts. K. M. B. Simon, F. M. Harvey, W. W. D. Thomson, N. W. Jenkin, L. M. Davies, D. T. Evans; Temp. Lieuts. J. Rusk, N. Morris, P. J. D. O'Malley, W. R. Read, J. Good; Temp. Hon. Lieuts. C. S. Gilman, M. C. Pruitt.

Canadian Army Medical Corps.

Temp. Col. C. A. Hodgetts is seconded for duty with the Ministry of National Service.

Temp. Major J. G. W. Johnson to be acting Lieutenant-Colonel while specially employed.

Temporary Majors (acting Lieutenant-Colonels) to be temporary Lieutenant-Colonels: N. B. Gwyn, H. H. Moshier.

Temp. Lieut. R. Robillard to be temporary Captain.

F. D. Derrick to be temporary Lieutenant.

VOLUNTEER FORCE.

Medical Volunteer Corps.—City of Aberdeen: M.O. and Temp. Capt. W. S. Cheyne, from 1st Bn. City of Aberdeen Vol. Reg., to be temp. Capt. M.O. and Temp. Capt. J. O. Wilson, from 2/1st Bn. County of Aberdeen Vol. Regt., to be temp. Capt. M.O. and Temp. Lt. R. A. Slessor, from 1/1st Bn. County of Aberdeen Vol. Regt., to be temp. Lt. Anglesea: M.O. and Temp. Capt. G. L. Jones, from 1st Bn. Anglesea Vol. Reg., to be temp. Capt. Ayrshire: M.O. and Temp. Capt. W. McAlister, from 2/1st Bn. Ayrshire Vol. Regt., to be temp. Capt. M.O. and Temp. Lt. F. McKenna, from 1/1st Bn. Ayrshire Vol. Regt., to be temp. Lt. Banffshire: M.O. and Temp. Lt. G. C. Grant, from 1st Bn. Banffshire Vol. Regt., to be temp. Lt. Bedfordshire: M.O. and Temp. Capt. F. B. W. Phillips, from 1st Bn., Bedfordshire Vol. Regt., to be temp. Capt. M.O. and Temp. Lt. N. Edwards, from 2nd Bn., Bedfordshire Vol. Regt., to be temp. Lt. Berkshire: M.O. and Temp. Lt. J. T. R. Miller, from 1st Bn., Berkshire Vol. Regt., to be temp. Lt. Berwickshire: M.O. and Temp. Capt. J. MacWatt, from 1st Bn., Berwickshire Vol. Regt., to be temp. Capt. City of Bristol: M.O. and Temp. Capt. H. I. Owen, from 1st Bn., City of Bristol Vol. Regt., to be temp. Capt. M.O. and Temp. Capt. F. E. Peake, from 2nd Bn., City of Bristol Vol. Regt., to be temp. Capt. Buckinghamshire: M.O. and Temp. Lt. H. Barrett, from 1st Bn., Buckingham Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. J. D. J. Harris, from 2nd Bn., Buckinghamshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. H. T. Wickham, from 3rd Bn., Buckinghamshire Vol. Regt., to be temp. Lt. Cambridgeshire: M.O. and Temp. Lt. A. J. Laird, from 1st Bn., Cambridgeshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. F. Robinson, from 2nd Bn., Cambridgeshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. F. W. Mawby, from 3rd Bn., Cambridgeshire Vol. Regt., to be temp. Lt. Carmarthenshire: M.O. and Temp. Capt. E. Evans, from 1st Bn., Carmarthenshire Vol. Regt., to be temp. Capt. Carnarvonshire: M.O. and Temp. Lt. R. R. Jones, from 1st Bn., Carnarvonshire Vol. Regt., to be temp. Lieut. Cheshire; M.O and Temp. Lt. L. C. A. Savatard, from 1st Bn., Cheshire Vol. Regt., to be temp. Lt. M.O and Temp Lt L. Pearson, from 2nd Bn., Cheshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. M. Young, from 3rd Bn., Cheshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. C. McA. Wilson, from 4th Bn., Cheshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. R. Cant, from 5th Bn., Cheshire Vol. Regt., to be temp Lt. M.O. and Temp. Lt. T. H. Smith, from 9th Bn., Cheshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. W. R. J. Garson, from 10th Bn., Cheshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. A. Banks, from 11th Bn., Cheshire Vol. Regt., to be temp. Lt. Clackmannanshire: M.O. and Temp. Capt. D. W. Currie, from 1st Bn., Clackmannanshire Vol. Regt., to be temp Capt. Cornwall: M.O. and Temp. Capt. A. J. Little, from 1st Bn., Cornwall Vol. Regt., to be temp. Capt. Cumberland: M.O. and Temp. Lt. J. R. S. Anderson, from Cumberland Motor Vol. Corps, to be temp. Lt. M.O. and Temp. Lt. F. H. Morison, from 1st Bn., Cumberland Vol. Regt., to be temp. Lt. Derbyshire: M.O. and Temp. Capt. G. S. Sims, from 1st Bn. Derbyshire Vol. Regt., to be temp. Capt. M.O. and Temp. Lt. W. E. Bond, from 2nd Bn., Derbyshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. W. R. Paton, from 3rd Bn., Derbyshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt A. Court, from 4th Bn., Derbyshire Vol. Regt. to be temp. Lt. M.O. and Temp. Lt G. E. Sawdon from 6th Bn., Derbyshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. S. J. Parkhill, from 7th Bn., Derbyshire Vol. Regt., to be temp. Lt M.O. and Temp. Lt. W. A. Walters, from 8th Bn., Derbyshire Vol. Regt., to be temp. Lt. Dorsetshire: M.O. and temp. Lt. G. G. Morrice, from 1st Bn., Dorsetshire Vol. Regt., to be temp. Lt. Dumbartonshire: M.O. and temp. Capt. J. R. F. Cullen from 1st Bn., Dumbartonshire Vol. Regt., to be temp. Capt. City of Dundee: M.O. and temp. Capt. D. J. Forbes, from 1/1st Bn., City of Dundee Vol. Regt., to be temp. Capt. Durham: M.O. and temp. Capt. J. J. Weir, from 1st. Bn. Durham Vol. Regt., to be temp. Lt. M.O. and temp. Capt. J. C. French, from 2nd Bn., Durham Vol. Regt., to be temp. Capt. M.O. and temp. Lt. S. G. Mostyn from 4th Bn., Durham Vol. Regt., to be temp. Lt. M.O. and temp. Lt. N. Phillipson, from 9th Bn., Durham Vol. Regt., to be temp. Lt. M.O. and temp. Lt. A. Kelly, from 12th Bn., Durham Vol. Regt., to be temp. Lt. City of Edinburgh: M.O. and temp. Lt W. G. Aitchison-Roberts from 1/1st Bn., City of Edinburgh Vol. Regt., to be temp. M.O and Temp. Capt. H. Hay, from 2/1st Bn. City of Edinburgh Vol. Regt., to be temp. Capt. Essex: M.O. and Temp Lt. G. F. Wilson from 1st Bn. Essex Vol. Regt., to be temp. Lt. M.O. and Temp Capt. J. H. Salter, from 3/2nd Bn Essex Vol. Regt., to be temp Capt. M.O. and Temp. Lt. F. Isitell, from 4th Bn. Essex Vol. Regt., to be temp. M.O. and Temp. Lt. G. F. Cooper, from 5th Bn. Essex Vol. Regt., to be temp. Lt. Fifeshire: M.O. and Temp. Capt. A. L. Curror, from 1st Fifeshire Vol. Regt., to be temp. Capt. County of London: M.O. and Temp. Lt. A. H. Gibbon, from County of London Vol. Eng., to be temp. Lt. West Riding: P. Bennett to be temp. Lt. North R. Grant to be temp. Capt. Lancashire: Temp. Capt. Stowell to be temp. Major. Northumberland: M. Thompson to be temp. Lt. Kent: F. Holgate-Smith to be temp. Lt. Lincolnshire: H. S. McIntosh to be temp. Lt. Middlesex: Temp. Major P. Darvil-Smith, from Middlesex Motor Volunteer Corps, to be temp. Major. Suffolk: Lt.-Col. W. Keates (late the Suffolk Regt.) to be temp. Lieut.-Col; to be temp. Majors: Lieut. H. G. Wood-Hill (late R.A.M.C.), Lieut. H. E. Barnes (late R.A.M.C.). R. W. Mullock (late Surgeon-Captain, 3rd E.A., Howitzer Brigade), Capt. J. R. Dobie (late R.A.M.C.), J. F. C. Hossack, A. M. N. Pringle, C. K. Moser, D. A. Carruthers (late Captain 1st Forfar R.G.A. (V.)); to be temp. Capts.: W. F. Fryer, H. P. Sleigh, D. N. Seth-Smith, G. H. Ransom, M. H. Monnigan (late Lt., 2nd V.B., Suffolk Regt.), G. I. T. Stewart, S. O. Eades, A. C. Young, G. R. Fox, F. C. Wethered, R. A. C. Bax (late Surg.-Lt. 1st V.B., "The Buffs," East Kent Regt.)

ROYAL AIR FORCE: *Medical Branch.*

The undermentioned are granted temporary commissions: Lieutenant-Colonels: Fleet-Surgs., R.N., R. H. Mornement, W. Pope, N. J. Roche, J. St. J. Murphy; Staff-Surg., R.N., H. C. As Captain: A. E. Henton. As Lieut.: A. K. Soutar, F. H. Wal

Appointments.

Successful applicants for vacancies, Secretaries of Public Institutions, and others possessing information suitable for this column, are invited to forward to THE LANCET *Office, directed to the Sub-Editor, not later than 9 o'clock on the Thursday morning of each week, such information for gratuitous publication.*

DALY, T. J., F.R.C.S. Irel., has been appointed Certifying Surgeon under the Factory and Workshop Acts for the Mullingar District of the county of Westmeath.

MACKENZIE, RACHEL E. W., M.B. Lond., Assistant Medical Officer of Health for the Borough of Woolwich.

ROBERTSON, D., Certifying Surgeon under the Factory and Workshop Acts for Aberdeen.

Vacancies.

For further information refer to the advertisement columns.

Alnwick Infirmary.—H.S. £150.
Birmingham. St Chad's Hospital.—Res. M.O. £150.
Birmingham University.—Sen. Demonstrator of Anatomy. £250.
Bristol Education Committee.—Female Asst. School M.O. £350.
Bristol Royal Infirmary.—H.P. and H.S. £120
Bristol University.—Demonstrator in Physiology.
Great Northern Central Hospital, London, N.—H.S. £100.
Hampstead General and North-West London Hospital.—Cas. O. £150.
Hospital for Consumption and Diseases of the Chest, Brompton.—Asst. Res. M.O. £100.
Hospital for Epilepsy and Paralysis, Maida Vale, W.—Asst. Phys.
Hospital for Sick Children, W.C.—H.S. £100.
Kensington Dispensary and Children's Hospital.—Res. M.O. £180.
Kensington and Fulham General Hospital, S.W.—Res. M.O. £250.
London County Mental Hospital, Coulsdon, Surrey.—L.T. Asst. M.O. 7 guineas a week.
Maidstone, West Kent General Hospital.—Sen. H.S. £250. Also Jun. H.S. £125.
Manchester County Asylum, Prestwich.—L.T. £7 7s. per week.
Manchester Education Committee.—Asst. School M.O. £350 to £500.
Ministry of Pensions, Alberton Tower Home of Recovery, Liverpool.—Res. M.O. £450.
Northamptonshire Sanatorium, Creaton.—Med. Supt. £300.
Portsmouth, Royal Hospital.—H.S. £200.
Queen Mary's Hospital for the East End, Stratford.—H.S.
Royal Free Hospital, Gray's Inn-road, W.C.—Female Cas. H.S. (£100), and Gynæcological Registrar.
St. Mark's Hospital for Cancer, Fistula, and Other Diseases of the Rectum, City-road, E.C.—H.S. £250
St. Mary's Hospital, Paddington.—Asst. Path. £100.
Sheffield Royal Hospital.—H.P. £140. Also Cas. O. £135.
Sheffield Royal Infirmary.—H.S. £120. Also H.P. £120.
Stockport Infirmary.—Jun. H.S. £200.
Stoke-on-Trent County Borough, Stanfield Sanatorium.—Asst. Tuberc. O. £360.
Walsall Education Committee.—L.T. Sch. Med. Insp. £400.
West London Hospital, Hammersmith-road, W.—H.S. £4 4s. weekly.
West Riding of Yorkshire, Maternity & Child Welfare.—Med. Prac. £400.
York City.—Temp. Tuberc. O. £500.
York County Hospital.—Female H.S. £200.

THE Chief Inspector of Factories, Home Office, S.W., gives notice of a vacancy for a Certifying Surgeon under the Factory and Workshop Acts at Aberdare, Glamorgan.

Births, Marriages, and Deaths

BIRTHS.

ALLNUTT.—On June 30th, at Horncliffe-road, Blackpool, the wife of Captain E. Bruce Allnutt, M.C., R.A.M.C., of a son.
MEYER.—On July 2nd, the wife of Surgeon R. Meyer, D.O. Oxon., B.A., M.D., F.R.C.S.E., R.N., of a son.
RUXTON.—On July 1st, to Captain H. W. B. Ruxton, R.A.M.C., and Mrs. Ruxton (*née* M. H. Naylor, M.B., B.S. Lond.), of The Mall, Brentford, W.—a daughter.

MARRIAGES.

HARVEY—HENDERSON.—On July 5th, at the Friends' Meeting House, Golders Green, Surgeon W. F. Harvey, R.N., to Margaret Muir, elder daughter of John Henderson, of Coringham-road, London, N.W.
WARD—GOURLEY.—On July 3rd, at St. Mary Abbot's, Kensington, Temp. Surgeon George E. S. Ward, M.D., R.N., to Una, youngest daughter of the late Dr. Gourley, of West Hartlepool, and Mrs. Gourley, of Harrogate.

DEATHS.

COWAN.—On July 1st, at Tenby (suddenly), John James Cowan, M.B., C.M. Edin.
FOULERTON.—On June 29th, at Pembridge-villas, John Foulerton, M.D., F.R.C.P. & S. Edin., F.G.S., in his 90th year.
KEALY.—On July 6th, at Ashley House, Gosport, J. W. Gregory Kealy, M.R.C.S., L.R.C.P., aged 60.
SENIER.—On June 29th, at Galway, Alfred Senier, M.D., D.Sc., Ph.D., Professor of Chemistry and Lecturer in Medical Jurisprudence and Hygiene in University College, Galway.

N.B.—A fee of 5s. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Medical Diary for the ensuing Week.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.1.

Tuesday, July 16th.

GENERAL MEETING OF FELLOWS, at 5 P.M.
Ballot for Election of Candidates to the Fellowship. (Names already circulated.)

Wednesday, July 17th.

OCCASIONAL LECTURE by Colonel William Hunter, C.B., A.M.S., in the Robert Barnes Hall, at 5.30 P.M., on
"The Prevention and Arrest of Lice-borne Diseases (Typhus, Relapsing, and Trench Fevers) by New Methods of Disinfection. A summarized account of two and a half years' practical experiences in the Eastern War Areas." (Illustrated by lantern.)

MEETINGS OF SECTIONS.

EPIDEMIOLOGY.—This Section is specially invited to attend Colonel Hunter's Lecture.

Thursday, July 18th.

DERMATOLOGY (Hon. Secretaries—J. E. R. McDonagh, Henry MacCormac; Acting Hon. Secretary—S. E. Dore): at 5 P.M.
Cases will be shown at 4.30 P.M.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

POST-GRADUATE COLLEGE, West London Hospital, Hammersmith-road, W.
Clinics each week-day at 2 P.M., Wednesday, Friday, and Saturday also at 10 A.M.
(Details of Post-Graduate Course were given in issue of June 29th.)

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.
Out-patients each day at 2.30 P.M.

THE THROAT HOSPITAL, Golden-square, W.
MONDAY, July 15th.—5.15 P.M., Special Demonstration of Selected Cases.
THURSDAY.—5.15 P.M., Clinical Lecture.

COLLEGE OF AMBULANCE, 3, Vere-street, Cavendish-square, W.
Course of Special Lectures and Demonstrations on Ambulance Work and First Aid (illustrated as far as may be possible and followed by a Discussion).
THURSDAY, July 18th.—4.30 P.M., Lecture X.:—Mr. G. F. Shee: The Work of the Royal National Life Boat Institution.

EDITORIAL NOTICES.

In consequence of the pressure on our space and the shortage of paper, the Editor may be compelled to abbreviate communications, as an alternative to their rejection, when time does not allow them to be reconsidered by their authors.

It is most important that communications relating to the Editorial business of THE LANCET should be addressed *exclusively* "TO THE EDITOR," and not in any case to any gentleman who may be supposed to be connected with the Editorial staff. It is urgently necessary that attention should be given to this notice.

Offices: 423, STRAND, LONDON, W.C. 2.

Communications, Letters, &c., to the Editor have been received from—

A.—Dr. G. R. Anderson, Southport; Australian Imperial Force, Lond., Surg.-Gen. of; Col. J. G. Adami, A.D.M.S.; Mr. W. D. Anderson, Keswick; Messrs. Adlard and Son and West Newman, Lond.

B.—Board of Agriculture and Fisheries, Lond.; Board of Trade, Coal Mines Dept., Lond.; Babies of the Empire, Lond., Sec. of; Capt. W. Langdon Brown, R.A.M.C.(T.); British Women's Hospital Nation's Fund for Nurses, Lond., Committee of; Mr. J. Bell, Lond.; Dr. C. A. Bucklin, Glasgow; Sir Thos. Barlow, Bt., K.C.V.O.; Dr. J. Brownlee, Lond.; Board of Trade, Asst. Sec. of, Lond.; British Museum (Natural History), Lond., Director of.

C.—Dr. F. G. Crookshank, Lond.; Dr. J. B. Christopherson, Khartoum; Children's Country Holidays Fund, Lond.; Dr. A. K. Chalmers, Glasgow; Mr. F. H. A. Clayton; Mr J. H. Clements, Winkleigh; Mr. A. L. Cameron, New York; Major W. B. Cameron, M.R.C.; Mr. A. H. Cheatle, Lond.

D.—Dr. V. Dickinson, Lond.

E.—Eugenics Education Society, Lond.

F.—Mr. H. G. Fell, Lond.; Factories, Chief Inspector of, Lond.

G.—Pte. P. Gibson, R.A.M.C.(T.); Mr. F. Golla, Sunningdale.

H.—Major A. T. Henderson, C.A.M.C.; Dr. J. B. Hurry, Lond.; Prof. R. Howden, Newcastle-upon-Tyne.

I.—Ilford, Medical Officer of Health of.

J.—Capt. W. Jameson, R.A.M.C.

K.—Mr. W. Kean, Glasgow.

L.—London Hospital Medical College, Sec. of; London County Council, Chairman of; London and Counties Medical Protection Society, Sec. of; Local Government Board, Sec. of.

M.—Medico-Psychological Association of Great Britain and Ireland; Dr. N. Macleod, Shanghai; Mr. J. F. McMillan; Mr. J. Y. W. MacAlister, Lond.; Major W. E. McKechnie, I.M.S.

N.—Miss J. Neil-Kerrison, Smethwick, Norwich, Medical Officer of Health of; *National Food Journal*, Lond.

O.—Mr. J. Offord, Lond.

P.—Poole Rural District, Medical Officer of Health of. Dr. F. C. Poynder, East Grinstead; Mr. R. H. A. Plimmer, Lond.; Dr. F. Prosser, Rainford.

R.—Miss E. A. Rout, Lond.; Mr. R. T. Reynolds, Redruth; Royal Sanitary Institute, Lond.; Royal College of Surgeons in Ireland, Dublin, Registrar of; Dr. C. Rolleston, Stamford.

S.—Sir Edward Schäfer, Edinburgh; Dr. A. E. Stansfeld, Lond.

T.—Dr. J. Tatham, Oxted; Dr. C. J. Thomas, Lond.

U.—University of Durham College of Medicine, Newcastle-on-Tyne, Sec. of; Under-Secretary of State, Home Office.

W.—Capt. A. H. Watson, R.A.M.C.; West London Medico-Chirurgical Society; Major F. R. Walshe, R.A.M.C.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE.

R. B. Campbell to be temporary Fleet-Surgeon.

To be temporary Surgeons: D. J. Micah, J. V. Mainprize, D. S. Prentice.

To be temporary Dental Surgeons: T. P. H. Roberts, R. Page, J. C. Payne.

ROYAL ARMY MEDICAL CORPS.

Major A. L. B. Green, Hereford Regiment (T.F.), to be temp. Major.

Temporary Captains relinquishing the acting rank of Major on re-posting: T. Martin, H. J. de Brent, A. S. K. Anderson, T. T. Higgins, F. C. Tibbs.

Temporary Captains to be acting Majors: J. F. R. Gairdner, J. McN. Murray, N. G. W. Davidson, H. Dudley, R. H. R. Whitaker, R. Hodson, J. G. Johnston, R. J. Vernon, S. J. L. Lindeman, A. M. Wood, R. R. Blair, W. B. G. Angus, H. C. Watson.

To be acting Majors while specially employed: Temp. Major M. Bridgman, Temp. Major C. M. Row, Temp. Capt. E. W. Willett.

To be Captains:—Captains from Special Reserve: R. A. Hepple, J. Y. Moore, A. L. Robertson, T. I. Dun, R. H. Leigh, H. G. Trayer, R. A. Austin, C. Popham, C. de W. Gibb, G. P. Kidd, S. D. Robertson, T. K. Boney, S. S. B. Harrison, H. D. Lane, F. C. Chandler, H. S. Milne, Q. V. B. Wallace, J. P. Quinn, J. B. Fotheringham; Temp. Capts. W. E. Adam, C. S. P. Hamilton, C. A. Bernard, R. E. Gibson, K. P. MacKenzie, E. G. Foley, S. Smith, J. H. Fletcher, J. H. Barry, G. D. R. Carr, D. H. Hadden, E. F. W. MacKenzie, C. Scales, A. Wilson, C. K. G. Dick, T. R. Snelling.

To be temporary Captains: Capt. S. S. Dunn (ret., Australian Army Medical Corps), attached R.A.M.C.; Temp. Lieut. A. J. Ferguson.

To be Lieutenants, and to be granted the temporary rank of Captain:—Captains from Special Reserve: F. J. Hallinan, J. H. Baird, W. D. Anderton, T. D. Inch, W. T. Hare, J. D. Proud, J. E. Rusby, J. H. C. Walker, M. B. King, W. Hunt, C. A. Slaughter, W. H. Ferguson, G. G. Drummond, F. G. L. Dawson, W. M. Cameron, A. Rodd, D. J. Batterham. Temporary Captains: T. J. L. Thompson, A. G. P. Hardwick, R. D. Davy, J. M. McKenzie, A. J. Hickey, W. J. Robertson, C. Russell, W. J. Knight, R. A. Mansell, W. L. Partridge, W. D. Newland, L. S. C. Roche, G. T. Baker, G. T. Garraway, G. E. Spicer. Captains from Territorial Force: S. Robertson, R. T. Jones.

Temporary Lieutenants to be temporary Captains: W. F. Erskine, O. May, G. A. Hoffmann, R. Alderson, W. P. Miles, J. Lambie, H. O'H. O'Neill, C. W. Preston-Hillary, H. G. F. Spurrell, S. E. Atkinson, J. Avery, H. V. Mitchell, W. B. Wilson, P. W. Hampton, R. Crawford, K. McK. Duncan, J. Ritchie, W. Anderson, W. Lilico, H. B. Wickham, J. Hunter, J. F. Bridge, J. Wylie, S. D. Craig, L. Hutchinson, E. S. Prior, E. O'D. Graham, R. Duncan, H. O. West, E. W. Witney, S. H. White, G. H. C. Lumsden, A. E. Knapp, Q. Madge, O. V. Payne, G. W. Curtis, W. A. Allison, E. Tate, J. D. Ferguson, A. J. May, A. B. Sykes, A. C. Renton, R. H. Thomson, F. G. Ralphs, W. H. F. Eales, J. A. Wood, T. Clarke, H. R. Wright, F. W. Pollard, V. G. Best, T. Gillespie, W. R. Waymark, J. Williamson, S. Wood, J. A. McSweeny, R. E. G. Gray, A. E. Leapingwell, H. T. P. Young, H. M. Roberts, J. F. Peart, V. Brown, W. B. Primrose, W. Weir, J. B. Aickin, J. A. Mearns, W. Mair, J. Steward, G. A. Pratt, A. H. B. Hartford, R. Peart, W. W. Cawlow, P. Talbot, J. C. Wootton, A. W. Ewing, W. Rotherham, A. Evans, A. C. Russell, J. Wilson, C. M. Ockwell, J. Dunbar, T. P. Robertson, L. Welply, F. H. Fuller, N. E. Sampey, J. J. F. Knight, C. B. Ticehurst, F. W. MacKichan, R. Brown, J. Scott, F. H. Dodd, J. H. Jones, D. P. Lindsay, L. H. Werden, N. Gray, J. S. Wilson, C. L. Driscoll, E. E. Paget-Tomlinson, G. C. Anderson, H. W. Horan, R. G. Smith, P. D. Hunter, B. J. Cusack, E. A. Sanders, J. R. Munro, R. J. W. McKane, J. Ferguson, D. D. Ritchie, R. J. Bentley, S. H. Sweet, H. Spurway, A. I. Shepherd-Walwyn, G. E. Thornton, W. S. Graham, J. K. Manson, J. Dalgleish, J. L. Maynell, E. M. Mall, S. W. White, J. K. Reid, W. Tregea, W. B. Clarke, S. N. Galbraith, R. MacM. Mahon, J. B. Cook, J. Grogono, E. W. Grogono, E. P. Harding, B. Kelly, C. A. B. Horsford, C. A. Lawrence, J. B. Banister, J. Ellenbogen, E. Morrison, P. J. Hay, J. A. W. Ponton, J. C. Ryan, B. Suggit, F. H. Diggle, A. M. Malcolmson, A. Tait, M. S. Wood, A. R. Taylor, G. H. Hackney, O. Smith, J. Cross, C. H. G. Lyall, E. Morgan, T. A. Davies, T. Kennedy, B. B. Phillips, C. B. Gerrard, C. B. M. Aldridge, R. N. Woodsend, J. McGibbon, R. T. A. Patchett, L. Wayne-Morgan, A. H. Gray, F. Crooks, H. Baird, V. J. Rigg, M. Aikman, P. L. Pollard, W. Cook, R. S. Strachan, D. O. Fairweather, T. Fraser, C. Brash, R. Taylor, J. D. Oliver, J. A. Powell, J. N. M. Sutherland, A. Matheson, F. L. Thomas, J. W. A. Wilson, D. L. G. Radford, F. A. Morrison, D. P. Smith, P. A. Hendley, S. W. Swindells, A. Westerman, G. Eager, E. G. D. Benson, G. Milne, C. M. Stevenson, U. Marks, T. B. Valle, A. H. Duckett, J. J. Todd, D. W. Tacey, H. R. Cran, R. N. Dunlop, J. G. Woolham, N. H. M. Burke, J. D. Hartley, J. D. Jones, G. Denholm, A. F. Waterhouse, M. D. Mackenzie, L. D. Callander, J. Dawson, H. C. Taylor, J. B. H. Holroyd, H. E. Middlebrooke, W. H. Parsinson, H. Maffin, T. Brodie, G. L. Langley, F. de R. Martyn, W. B. Peacock, A. O. Bisson, J. F. Lindsay, F. McG. Loughnane, C. Gray, G. D. Dawson, H. A. Mason, J. Gilchrist, J. Orr, J. W. McDougall, G. Mowat, D. R. C. Shepherd, C. L. Stewart, E. C. Roberts, H. F. Marshall, H. R. L. Aliott, F. F. C. Willington, R. C. Pitt, A. J. Adkins, W. H. Gibson, J. T. R. MacGill, D. Longwill, M. J. Macauley, F. H. Mosse, D. P. Macdonald, L. D. Wright, R. Fraser, E. J. Manning, C. J. Taylor, W. Duguid, St. G. M. L. Homan, C. W. C. Harvey, G. E. A. Mitchell, T. R. Couldrey, P. J. O'Brien, J. Fortune, I. B. Richardson, C. H. Gunson, W. B. A. Moore, E. S. G. Johnson, R. W. Dale, A. G. Bland, A. S. Findlay, J. A. Hagerty, H. P. Wright, F. D. Scott, W. H. Gowans, A. G. Stewart, J. W. Robertson, G. Garland, A. R. Jennings, H. Thorp.

A. E. J. Barcroft and T. Bell, late temporary Captains, are granted the honorary rank of Captain.

Temp. Hon. Lieut. D. A. Bartley to be temporary honorary Captain.

Officers relinquishing their commissions: Temp. Major W. Robinson (on ceasing to be employed at the Sutherland War Hospital); Temp. Capts. K. M. B. Simon, F. M. Harvey, W. W. D. Thomson, N. W. Jenkin, L. M. Davies, D. T. Evans; Temp. Lieuts. J. Rusk, N. Morris, P. J. D. O'Malley, W. R. Read, J. Good; Temp. Hon. Lieuts. C. S. Gilman, M. C. Pruitt.

Canadian Army Medical Corps.

Temp. Col. C. A. Hodgetts is seconded for duty with the Ministry of National Service.

Temp. Major J. G. W. Johnson to be acting Lieutenant-Colonel while specially employed.

Temporary Majors (acting Lieutenant-Colonels) to be temporary Lieutenant-Colonels: N. B. Gwyn, H. H. Moshier.

Temp. Lieut. R. Robillard to be temporary Captain.

F. D. Derrick to be temporary Lieutenant.

VOLUNTEER FORCE.

Medical Volunteer Corps.—City of Aberdeen: M.O. and Temp. Capt. W. S. Cheyne, from 1st Bn. City of Aberdeen Vol. Reg., to be temp. Capt. M.O. and Temp. Capt. J. O. Wilson, from 2/1st Bn. County of Aberdeen Vol. Regt., to be temp. Capt. M.O. and Temp. Lt. R. A. Slessor, from 1/1st Bn. County of Aberdeen Vol. Regt., to be temp. Lt. Anglesea: M.O. and Temp. Capt. G. L. Jones, from 1st Bn. Anglesea Vol. Reg., to be temp. Capt. Ayrshire: M.O. and Temp. Capt. W. McAlister, from 2/1st Bn. Ayrshire Vol. Regt., to be temp. Capt. M.O and Temp. Lt. F. McKenna, from 1/1st Bn. Ayrshire Vol. Regt., to be temp. Lt. Banffshire: M.O. and Temp. Lt. G. C. Grant, from 1st Bn. Banffshire Vol. Regt., to be temp. Lt. Bedfordshire: M.O. and Temp. Capt. F. B. W. Phillips, from 1st Bn., Bedfordshire Vol. Regt., to be temp. Capt. M.O. and Temp. Lt. N. Edwards, from 2nd Bn., Bedfordshire Vol. Regt., to be temp. Lt. Berkshire: M.O. and Temp. Lt. J. T. R. Miller, from 1st Bn., Berkshire Vol. Regt., to be temp. Lt. Berwickshire: M.O. and Temp. Capt. J. MacWatt, from 1st Bn., Berwickshire Vol. Regt., to be temp. Capt. City of Bristol: M.O. and Temp. Capt. H. I. Owen, from 1st Bn., City of Bristol Vol. Regt., to be temp. Capt. M.O. and Temp. Capt. F. E. Peake, from 2nd Bn., City of Bristol Vol. Regt., to be temp. Capt. Buckinghamshire: M.O. and Temp. Lt. H. Barrett, from 1st Bn., Buckingham Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. J. D. J. Harris, from 2nd Bn., Buckinghamshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. H. T. Wickham, from 3rd Bn., Buckinghamshire Vol. Regt., to be temp. Lt. Cambridgeshire: M.O. and Temp. Lt. A. J. Laird, from 1st Bn., Cambridgeshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. F. Robinson, from 2nd Bn., Cambridgeshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. F. W. Mawby, from 3rd Bn., Cambridgeshire Vol. Regt., to be temp. Lt. Carmarthenshire: M.O. and Temp. Capt. E. Evans, from 1st Bn., Carmarthenshire Vol. Regt., to be temp. Capt. Carnarvonshire: M.O. and Temp. Lt. R. R. Jones, from 1st Bn., Carnarvonshire Vol. Regt., to be temp. Lieut. Cheshire: M.O. and Temp. Lt. L. C. A. Savatard, from 1st Bn., Cheshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. L. Pearson, from 2nd Bn., Cheshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. M. Young, from 3rd Bn., Cheshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. C. McA. Wilson, from 4th Bn., Cheshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. F. Cant, from 5th Bn., Cheshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. T. H. Smith, from 9th Bn., Cheshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. W. R. J. Garson, from 10th Bn., Cheshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. A. Banks, from 11th Bn., Cheshire Vol. Regt., to be temp. Lt. Clackmannanshire: M.O. and Temp. Capt. D. W. Currie, from 1st Bn., Clackmannanshire Vol. Regt., to be temp Capt. Cornwall: M.O. and Temp. Capt. A. J. Little, from 1st Bn., Cornwall Vol. Regt., to be temp. Capt. Cumberland: M.O. and Temp. Lt. J. R. S. Anderson, from Cumberland Motor Vol. Corps, to be temp. Lt. M.O. and Temp. Lt. F. H. Morison, from 1st Bn., Cumberland Vol. Regt., to be temp. Lt. Derbyshire: M.O. and Temp. Capt. G. S. Sims, from 1st Bn., Derbyshire Vol. Regt., to be temp. Capt. M.O. and Temp. Lt. W. E. Bond, from 2nd Bn., Derbyshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. W. R. Paton, from 3rd Bn., Derbyshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. A. Court, from 4th Bn., Derbyshire Vol. Regt. to be temp. Lt. M.O. and Temp. Lt. G. E. Sawdon, from 6th Bn., Derbyshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. S. J. Parkhill, from 7th Bn., Derbyshire Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. W. A. Walters, from 8th Bn., Derbyshire Vol. Regt., to be temp. Lt. Dorsetshire: M.O. and temp. Lt. G. G. Morrice, from 1st Bn., Dorsetshire Vol. Regt., to be temp. Lt. Dumbartonshire: M.O. and temp. Capt. J. R. F. Cullen from 1st Bn., Dumbartonshire Vol. Regt., to be temp. Capt. City of Dundee: M.O. and temp. Capt. D. J. Forbes, from 1/1st Bn., City of Dundee Vol. Regt., to be temp. Capt. Durham: M.O. and temp. Lt. J. J. Weir, from 1st. Bn. Durham Vol. Regt., to be temp. Lt. M.O. and temp. Capt. J. C. French, from 2nd Bn., Durham Vol. Regt., to be temp. Capt. M.O. and temp. Lt. S. G. Mostyn from 4th Bn., Durham Vol. Regt., to be temp. Lt. M.O. and temp. Lt. N. Philipson, from 9th Bn., Durham Vol. Regt., to be temp. Lt. M.O. and temp. Lt. A. D. Kelly, from 12th Bn., Durham Vol. Regt., to be temp. Lt. City of Edinburgh: M.O. and temp. Lt. W. G. Aitchison-Robertson from 1/1st Bn., City of Edinburgh Vol. Regt., to be temp. Lt. M.O and Temp. Capt. H. Hay, from 2/1st Bn. City of Edinburgh Vol. Regt., to be temp. Capt. Essex: M.O. and Temp. Lt. G. F. Wilson from 1st Bn. Essex Vol. Regt., to be temp. Lt. M.O. and Temp. Capt. J. H. Salter, from 3/2nd Bn. Essex Vol. Regt., to be temp. Capt. M.O. and Temp. Lt. F. Iatell, from 4th Bn. Essex Vol. Regt., to be temp. Lt. M.O. and Temp. Lt. G. F. Cooper, from 5th Bn. Essex Vol. Regt., to be temp. Lt. Fifeshire: M.O. and Temp. Capt. A. L. Curror, from 1st Bn. Fifeshire Vol. Regt., to be temp. Capt. County of London: M.O. and Temp. Lt. A. H. Gibbon, from County of London Vol. Eng., to be temp. Lt. West Riding: P. Bennett to be temp. Lt. Norfolk: R. Grant to be temp. Capt. Lancashire: Temp. Capt. G. Stowell to be temp. Major. Northumberland: M. Thompson to be temp. Lt. Kent: F. Holgate-Smith to be temp. Lt. Lincolnshire: H. S. McIntosh to be temp. Lt. Middlesex: Temp. Major P. G. Darvil-Smith, from Middlesex Motor Volunteer Corps, to be temp. Major. Suffolk: Lt.-Col. W. Keates (late the Suffolk Regt.) to be temp. Lieut.-Col; to be temp. Majors: Lieut. H. G. Wood-Hill (late R.A.M.C.), Lieut. H. E. Barnes (late R.A.M.C.), R. W. Mullock (late Surgeon-Captain, 3rd E.A., Howitzer Brigade), Capt. J. R. Dobbs (late R.A.M.C.), J. F. C. Hossack, A. M. N. Pringle, C. K. Moseley, D. A. Carruthers (late Captain 1st Forfar R.G.A. (V.)); to be temp. Capts.: W. F. Fryer, H. P. Sleigh, D. N. Seth-Smith, G. H. Ransome, M. H. Mannigan (late Lt., 2nd V.B., Suffolk Regt.), G. I. T. Stewart, S. O. Eades, A. C. Young, G. R. Fox, F. C. Wethereil, E. A. C. Bayly (late Surg.-Lt. 1st V.B., "The Buffs," East Kent Regt.)

ROYAL AIR FORCE: *Medical Branch.*

The undermentioned are granted temporary commissions as Lieutenant-Colonels: Fleet-Surgs., R.N., R. H. Mornement, W. Pope, N. J. Roche, J. St. J. Murphy; Staff-Surg., R.N., H. Cooper. As Captain: A. E. Henton. As Lieut.: A. K. Soutar, F. H. Wallace.

Appointments.

Successful applicants for vacancies, Secretaries of Public Institutions, and others possessing information suitable for this column, are invited to forward to THE LANCET *Office, directed to the Sub-Editor, not later than 9 o'clock on the Thursday morning of each week, such information for gratuitous publication.*

DALY, T. J., F.R.C.S. Irel., has been appointed Certifying Surgeon under the Factory and Workshop Acts for the Mullingar District of the county of Westmeath.

MACKENZIE, RACHEL E. W., M.B. Lond., Assistant Medical Officer of Health for the Borough of Woolwich.

ROBERTSON, D., Certifying Surgeon under the Factory and Workshop Acts for Aberdeen.

Vacancies.

For further information refer to the advertisement columns.

Alnwick Infirmary.—H.S. £150.
Birmingham. St. Chad's Hospital.—Res. M.O. £150.
Birmingham University.—Sen. Demonstrator of Anatomy. £250.
Bristol Education Committee.—Female Asst. School M.O. £350.
Bristol Royal Infirmary.—H.P. and H.S. £120
Bristol University.—Demonstratoy in Physiology.
Great Northern Central Hospital, London, N.—H.S. £100.
Hampstead General and North-West London Hospital.—Cas. O. £150.
Hospital for Consumption and Diseases of the Chest, Brompton.—Asst. Res. M.O. £100.
Hospital for Epilepsy and Paralysis, Maida Vale, W.—Asst. Phys.
Hospital for Sick Children, W.C.—H.S. £100.
Kensington Dispensary and Children's Hospital.—Res. M.O. £180.
Kensington and Fulham General Hospital, S.W.—Res. M.O. £250.
London County Mental Hospital, Coulsdon, Surrey.—L.T. Asst. M.O. 7 guineas a week.
Maidstone, West Kent General Hospital.—Sen. H.S. £250. Also Jun. H.S. £125.
Manchester County Asylum, Prestwich.—L.T. £7 7s. per week.
Manchester Education Committee.—Asst. School M.O. £350 to £500.
Ministry of Pensions, Allerton Tower Home of Recovery, Liverpool.—Res. M.O. £450.
Northamptonshire Sanatorium, Creaton.—Med. Supt. £300.
Portsmouth, Royal Hospital.—H.S. £200.
Queen Mary's Hospital for the East End, Stratford.—H.S.
Royal Free Hospital, Gray's Inn-road, W.C.—Female Cas. H.S. (£100), and Gynæcological Registrar.
St. Mark's Hospital for Cancer, Fistula, and Other Diseases of the Rectum, City-road, E.C.—H.S. £250
St. Mary's Hospital, Paddington.—Asst. Path. £100.
Sheffield Royal Hospital.—H.P. £140. Also Cas. O. £135.
Sheffield Royal Infirmary.—H.S. £120. Also H.P. £120.
Stockport Infirmary.—Jun. H.S. £200.
Stoke-on-Trent County Borough, Stanfield Sanatorium.—Asst. Tuberc. O. £360.
Walsall Education Committee.—L.T. Sch. Med. Insp. £400.
West London Hospital, Hammersmith-road, W.—H.S. £4 4s. weekly.
West Riding of Yorkshire, Maternity & Child Welfare.—Med. Prac. £400.
York Asylum.—Temp. Tuberc. O. £500.
York County Hospital.—Female H.S. £200.

THE Chief Inspector of Factories, Home Office, S.W., gives notice of a vacancy for a Certifying Surgeon under the Factory and Workshop Acts at Aberdare, Glamorgan.

Births, Marriages, and Deaths

BIRTHS.

ALLNUTT.—On June 30th, at Hornecliffe-road, Blackpool, the wife of Captain E. Bruce Allnutt, M.C., R.A.M.C., of a son.

MEYER.—On July 2nd, the wife of Surgeon R. Meyer, D.O. Oxon., B.A., M.D., F.R.C.S.E., R.N., of a son.

RUXTON.—On July 1st, to Captain H. W. B. Ruxton, R.A.M.C., and Mrs. Ruxton (*née* M. H. Naylor, M.B., B.S. Lond.), of The Mall, Brentford, W.—a daughter.

MARRIAGES.

HARVEY—HENDERSON.—On July 5th, at the Friends' Meeting House, Golders Green, Surgeon W. F. Harvey, R.N., to Margaret Muir, elder daughter of John Henderson, of Coringham-road, London, N.W.

WARD—GOURLEY.—On July 3rd, at St. Mary Abbot's, Kensington, Temp. Surgeon George E. S. Ward, M.D., R.N., to Una, youngest daughter of the late Dr. Gourley, of West Hartlepool, and Mrs. Gourley, of Harrogate.

DEATHS.

COWAN.—On July 1st, at Tenby (suddenly), John James Cowan, M.B., C.M. Edin.

FOULERTON.—On June 29th, at Pembridge-villas, John Foulerton, M.D., F.R.C.P. & S. Edin., F.G.S., in his 90th year.

KEALY.—On July 6th, at Ashley House, Gosport, J. W. Gregory Kealy, M.R.C.S., L.R.C.P., aged 60.

SENIER.—On June 29th, at Galway, Alfred Senier, M.D., D.Sc., Ph.D., Professor of Chemistry and Lecturer in Medical Jurisprudence and Hygiene in University College, Galway.

N.B.—A fee of 5s. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Medical Diary for the ensuing Week.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.1.

Tuesday, July 16th.

GENERAL MEETING OF FELLOWS, at 5 P.M.
Ballot for Election of Candidates to the Fellowship. (Names already circulated.)

Wednesday, July 17th.

OCCASIONAL LECTURE by Colonel William Hunter, C.B., A.M.S., in the Robert Barnes Hall, at 5.30 P.M., on
"The Prevention and Arrest of Lice-borne Diseases (Typhus, Relapsing, and Trench Fevers) by New Methods of Disinfection. A summarized account of two and a half years' practical experiences in the Eastern War Areas." (Illustrated by lantern.)

MEETINGS OF SECTIONS.

EPIDEMIOLOGY.—This Section is specially invited to attend Colonel Hunter's Lecture.

Thursday, July 18th.

DERMATOLOGY (Hon. Secretaries—J. E. R. McDonagh, Henry MacCormac; Acting Hon. Secretary—S. E. Dore): at 5 P.M.
Cases will be shown at 4.30 P.M.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

POST-GRADUATE COLLEGE, West London Hospital, Hammersmith-road, W.
Clinics each week-day at 2 P.M., Wednesday, Friday, and Saturday also at 10 A.M.
(Details of Post-Graduate Course were given in issue of June 29th.)

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.
Out-patients each day at 2.30 P.M.

THE THROAT HOSPITAL, Golden-square, W.
MONDAY, July 15th.—5.15 P.M., Special Demonstration of Selected Cases.
THURSDAY.—5.15 P.M., Clinical Lecture.

COLLEGE OF AMBULANCE, 3, Vere-street, Cavendish-square, W.
Course of Special Lectures and Demonstrations on Ambulance Work and First Aid (illustrated as far as may be possible and followed by a Discussion).
THURSDAY, July 18th.—4.30 P.M., Lecture X.:—Mr. G. F. Shee: The Work of the Royal National Life Boat Institution.

EDITORIAL NOTICES.

In consequence of the pressure on our space and the shortage of paper, the Editor may be compelled to abbreviate communications, as an alternative to their rejection, when time does not allow them to be reconsidered by their authors.

It is most important that communications relating to the Editorial business of THE LANCET should be addressed *exclusively* "TO THE EDITOR," and not in any case to any gentleman who may be supposed to be connected with the Editorial staff. It is urgently necessary that attention should be given to this notice.

Offices: 423, STRAND, LONDON, W.C. 2.

Communications, Letters, &c., to the Editor have been received from—

A.—Dr. G. R. Anderson, Southport; Australian Imperial Force, Lond., Surg.-Gen. of; Col. J. G. Adami, A.D.M.S.; Mr. W. D. Anderson, Keswick; Messrs. Adlard and Son and West Newman, Lond.

B.—Board of Agriculture and Fisheries, Lond.; Board of Trade, Coal Mines Dept., Lond.; Babies of the Empire, Lond., Sec. of; Capt. W. Langdon Brown, R.A.M.C.(T.); British Women's Hospital Nation's Fund for Nurses, Lond., Committee of; Mr. J. Bell, Lond.; Dr. C. A. Bucklin, Glasgow; Sir Thos. Barlow, Bt., K.C.V.O.; Dr. J. Brownlee, Lond.; Board of Trade, Asst. Sec. of, Lond.; British Museum (Natural History), Lond., Director of.

C.—Dr. F. G. Crookshank, Lond.; Dr. J. B. Christopherson, Khartoum; Children's Country Holidays Fund, Lond.; Dr. A. K. Chalmers, Glasgow; Mr. F. H. A. Clayton; Mr. J. H. Clements, Winkleigh; Mr. A. L. Cameron, New York; Major W. B. Cameron, M.R.C.; Mr. A. H. Cheatle, Lond.

D.—Dr. V. Dickinson, Lond.

E.—Eugenics Education Society, Lond.

F.—Mr. H. G. Fell, Lond.; Factories, Chief Inspector of, Lond.

G.—Pte. P. Gibson, R.A.M.C.(T.); Mr. F. Golla, Sunningdale.

H.—Major A. T. Henderson, C.A.M.C.; Dr. J. B. Hurry, Lond.; Prof. R. Howden, Newcastle-upon-Tyne.

I.—Ilford, Medical Officer of Health of.

J.—Capt. W. Jameson, R.A.M.C.

K.—Mr. W. Kean, Glasgow.

L.—London Hospital Medical College, Sec. of; London County Council, Chairman of; London and Counties Medical Protection Society, Sec. of; Local Government Board, Sec. of.

M.—Medico-Psychological Association of Great Britain and Ireland; Dr. N. Macleod, Shanghai; Mr. J. F. McMillan; Mr. J. Y. W. MacAlister, Lond.; Major W. E. McKechnie, I.M.S.

N.—Miss J. Neil-Kerrison, Smethwick, Norwich, Medical Officer of Health of; *National Food Journal*, Lond.

O.—Mr. J. Offord, Lond.

P.—Poole Rural District, Medical Officer of Health of. Dr. F. C. Poynder, East Grinstead; Mr. R. H. A. Plimmer, Lond.; Dr. F. Prosser, Rainford.

R.—Miss E. A. Rout, Lond.; Mr. R. T. Reynolds, Redruth; Royal Sanitary Institute, Lond.; Royal College of Surgeons in Ireland, Dublin, Registrar of; Dr. C. Rolleston, Stamford.

S.—Sir Edward Schäfer, Edinburgh; Dr. A. E. Stansfeld, Lond.

T.—Dr. J. Tatham, Oxted; Dr. C. J. Thomas, Lond.

U.—University of Durham College of Medicine, Newcastle-on-Tyne, Sec. of; Under-Secretary of State, Home Office.

W.—Capt. A. H. Watson, R.A.M.C.; West London Medico-Chirurgical Society; Major F. R. Walshe, R.A.M.C.

Notes, Short Comments, and Answers to Correspondents.

FOLK-MEDICINE IN THE ARAN ISLANDS.

In her "Glimpses of My Life in Aran," Miss Hedderman, a district nurse, describes a number of survivals which in the past must have baffled medical men in many districts nearer the centres of civilisation than the remote and often inaccessible Aran Islands. Belief in the evil eye was once universal; it is still firmly rooted among the popular superstitions of the Western Irish.

"A child bitten by a dog was thought to have been 'looked upon,'" she writes, "by a person possessing this evil influence." A hydrophobia cure, once universal, had been resorted to and the child had been treated with a hair of the dog that bit it. The hair of the shaggy animal had been rubbed stiffly across the boy's mouth, causing intense torture to the bleeding patient. We are not told where the bite was, but we presume it was on the lips. The dog itself had had its hair dragged off and had then been drowned in the sea. It was three weeks before Miss Hedderman, a patient apostle of Listerism, could free the wound from the "hair-conveyed" poison by the use of warm boric lotion.

The "saliva cure" met Miss Hedderman at every turn in connexion with the evil eye. The person accused of casting a spell can also cure it by spitting. Sputum was doubtless once held to convey the soul or, like blood, to contain the soul and, on the homœopathic principle, the magician's soul can cure the evil wrought by the magician's eye. In cases of acute disease

> "the first resort is the saliva cure, and should the person accused of casting the spell resent the insinuation and not be friendly disposed in that special direction, the patient's progress and relief from suffering are supposed to be hindered until he [the caster of the spell] enters the sick-room and saturates the bed-clothes with this filthy secretion."

A new-born child in Aran must be duly spat upon by the first person entering the lying-in chamber, and the compliment must be extended first to the mother, then to the medical man, nurse, or other attendant. The Aran islanders regard this spitting as a potent charm. In other parts of the world people spit on an object—a coin, for instance, in the case of a first sale in a new shop—"for luck." Readers of Dickens will remember that when Martin Chuzzlewit lay ill of a fever a local resident spat a kind of halo round the sick man's head. Dickens sees in this achievement only an instance of bravado and nastiness, and does not suggest the performance of some dimly remembered ritual similar to that described in Miss Hedderman's book.

Magic and witchcraft, like therapeutic virtue, are supposed to reside in certain persons or families. Thus the light-haired or red-haired woman is regarded as much of a witch, and this belief seems to point to a time when Ireland, inhabited by dark-haired people, was invaded by the Norse or the hated Saxon, or even by an older race.

Fairies, according to some folklorists, are the representatives in modern superstition of ancient races, often smaller in stature than those who have supplanted them. Fairies are mysterious, often malevolent, and given to kidnapping children, and this is the character often borne by an aboriginal race, driven into forests and swamps by newcomers and given to furtive reappearances and acts of treachery. The Aran islanders believe that fairies meet them in certain places, as for instance "on the rocks" of the lonely seashore, and that they there work spells on them, damaging to health.

A belief of the Aran Islands mothers is to the effect that sick children are changelings. Thus Miss Hedderman numbered among her charges a little golden-haired girl very ill of pneumonia. The mother, on being told that only the greatest care would keep the child alive, replied, sadly but emphatically: "She is gone; she has been taken by the fairies," who "have substituted 'that object,'" pointing to the poor little patient on the bed.

The Aran women, like all tribal women, are truer to the primitive type than the men, who travel and come under the influence of modern ideas.

RESUSCITATION FROM DROWNING.

In THE LANCET of July 6th (p. 30), under this heading, we reported that Dr. F. J. Waldo, the City coroner, had called attention to the lack of proper provision in riparian districts for the resuscitation of people apparently drowned. Another aspect of the subject was dealt with at the College of Ambulance (3, Vere-street, London, W.), on July 4th, by Mr. William Henry, the founder and secretary of the Royal Life-Saving Society, who, on the occasion of the eighth of the series of lectures on First-aid, gave a demonstration of the methods of teaching the principles of saving life from drowning. Dr. T. N. Kelynack, who presided, said the objects of the Royal Life-Saving Society were to promote technical education in life-saving and the resuscitation of the apparently drowned, and to stimulate public opinion in favour of the general adoption of swimming and life-saving in schools and other establishments. Previous to the demonstration by a team of boys from Lady Owen's School, Islington, who illustrated the five methods of rescue, the three methods of release from the clutch of a drowning person, and the Schäfer method of resuscitation, Mr. Henry said that the society was started in London some 26 years ago and there were now branches in every capital in the British Empire, while in Australia and New Zealand it was subsidised by the Governments. In the London district last year the members of the society had saved the lives of over 200 people without the loss of a single rescuer. Swimming and life-saving were just as good exercises as cricket, and he hoped would some day be used instead of that sport in schools. It was not necessary for the rescuer to be a stronger person than the rescued nor an expert swimmer, and in the records of the Royal Humane Society for 100 years only two cases could be found of champion swimmers receiving awards for life-saving. The system was being taught at Harrow School, where the teaching was in charge of one of the senior boys. Sir James Cantlie, who moved a vote of thanks to the lecturer, directed attention to the importance of first-aid instruction, remarking that no first-aid was taught in hospitals to either nurses or doctors. While the Schäfer method of resuscitation might perhaps be the best for use in cases of drowning, it was impossible to use it in many accidents, on the operating-table, for instance, and other methods should not be forgotten.

[It may be mentioned that the Hunterian Lectures by Professor Arthur Keith (THE LANCET, 1909, i., 745, 825, 895) give, besides an historical summary of the Royal Humane Society, an account of the methods used since 1774 for the resuscitation of the apparently drowned.]

AN EXTEMPORISED CENTRIFUGE.

Major W. E. Home, R.A.M.C., sends us a note on an extemporised electric centrifuge devised by Private P. Gibson, R.A.M.C. (T.), first-class nursing orderly and laboratory attendant of H.M.A.T. *Essequibo*. The horizontal arm of a hand centrifuge with the buckets is taken and lashed to two of the arms of a ventilating fan hanging from the laboratory roof. When the fan is switched on the buckets fly out, the velocity reached being sufficient to throw down urinary sediments and even red blood cells. The device may be of use to others.

THE USE OF FRUIT-STONES FOR WAR PURPOSES.

A MEMORANDUM marked "Urgent" has been sent from the Local Government Board to town councils, urban and rural district councils, boards of guardians, and other Poor-law authorities, stating that *all fruit-stones*, including *date-stones*, and *hard nut-shells* are immediately required for an *urgent war purpose*. The National Salvage Council has been requested to arrange the collection of these materials, and they have already approached jam makers, hotel and restaurant proprietors, and secretaries of clubs, hospitals, and institutions. It is felt that Poor-law authorities and their staffs will gladly coöperate in this matter, and they are accordingly asked to ensure that the stones of all fruit consumed or made into jam in their institutions are collected and forwarded, carriage forward, O.H.M.S., to the Officer in Charge, Munitions Depôt, Southend Gas Works, Southend-on-Sea. Official labels will be issued shortly by the National Salvage Council, and stones should be carefully saved until these labels are received. In making jam all stones should be excluded. It is important that stones and nut-shells should be forwarded in a dry condition. Stones should be dried by being placed for a short time in the sun or in an oven. If possible stones should be packed in bags or sacks, fruit-stones being kept separate from nut-shells. Any inquiries should be addressed to the Director-General, National Salvage, Caxton House, Tothill-street, S.W.1.

Dr. J. C. Uhthoff has been promoted from honorary Serving Brother to a Knight of Grace of the Order of the Hospital of St. John of Jerusalem in England.

Dr. J. N. Langley, professor of physiology in the University of Cambridge, has been elected a foreign member of the Royal Academy "dei Lincei," Rome.

Professor Sir Edward Schafer wishes it to be known that he is adopting the name of Sharpey before the surname of Schafer.

AMONG the signers of the Declaration of Independence of the United States of America on July 4th, 1776, were the following physicians: Josiah Bartlett, New Hampshire, born in November, 1729; Lyman Hall, Georgia, born in 1731; Benjamin Rush, Pennsylvania, born Dec. 24th, 1745; George Taylor, Pennsylvania, born in 1716; Matthew Thornton, New Hampshire, born in 1714; and Oliver Wolcott, Connecticut, born Nov. 26th, 1726. They died at the ages of 66, 53, 68, 65, 89, and 72 respectively. There were six physicians, but 26 lawyers out of the 56 signatories.